vol. III no. 10
JUNE, 1944

School Shop

FOR INDUSTRIAL ARTS & VOCATIONAL EDUCATION TEACHERS

PIT

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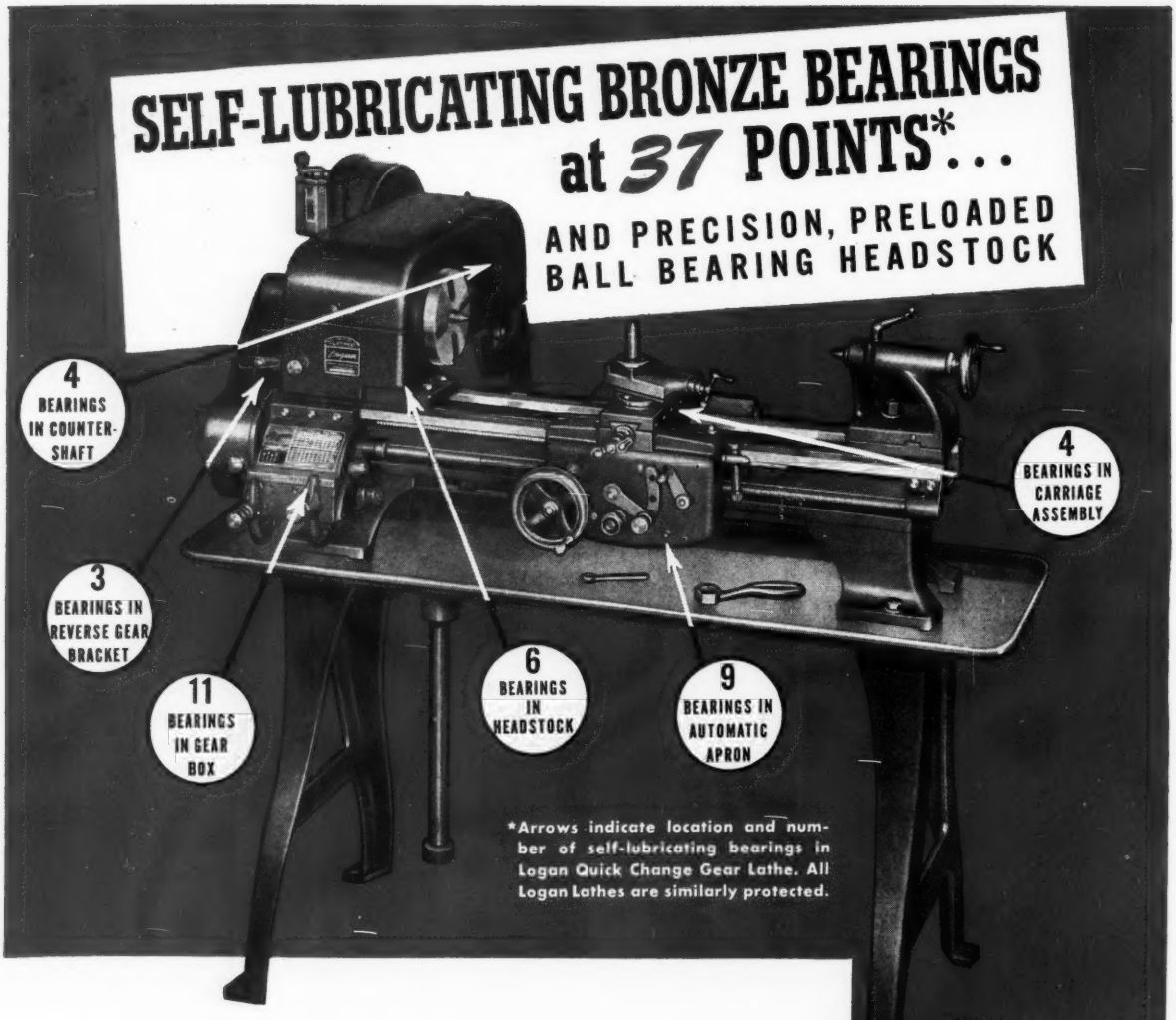
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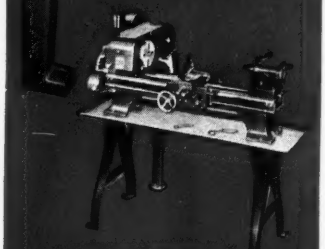

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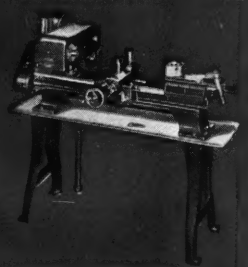

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School Shop

FOR INDUSTRIAL ARTS & VOCATIONAL EDUCATION TEACHERS

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June, 1944
Vol. III, No. 10

Special Preinduction Issue

At the request of the War Department SCHOOL SHOP is glad to present this special issue devoted to a presentation of the way industrial arts and vocational teachers can contribute mightily to the war effort by training students **now** in the skills and fundamental knowledge which they will use in the armed forces when they are inducted. Victory will come just that much sooner if schools do their part. These articles, for the most part, describe actual ways the shop departments of schools are already helping in the effort to give every potential inductee as much training as possible before he joins the armed services.

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School Shop is published monthly, September through June, at Ann Arbor, Michigan. Manuscripts are paid for at regular space rates and should be addressed to the Editor, School Shop, 330 South State Street, Ann Arbor, Michigan. Subscription rates to libraries and institutions, $2.00 a year; Foreign and Canadian, $3.00 a year. 25 cents a copy. Printed in the U.S.A.

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Advertising Representatives: Eastern—Ray M. Carr, 545 Fifth Ave., New York 17, N.Y., Murray Hill 2-4217; Mid-West—MacIntyre-Simpson & Woods, 75 East Wacker Drive, Chicago 1, Central 1715, and 1900 Euclid Avenue, Cleveland 15, Ohio, Cherry 1501. Member Controlled Circulation Audit, Inc.

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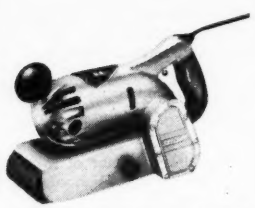

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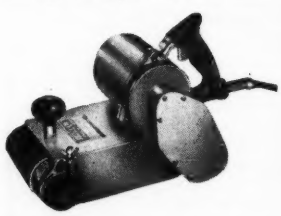

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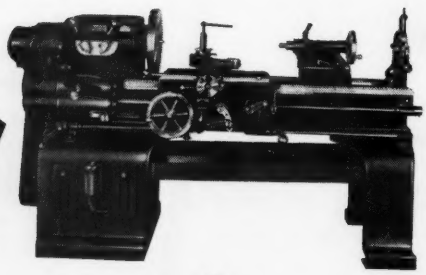

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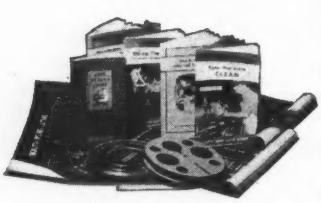

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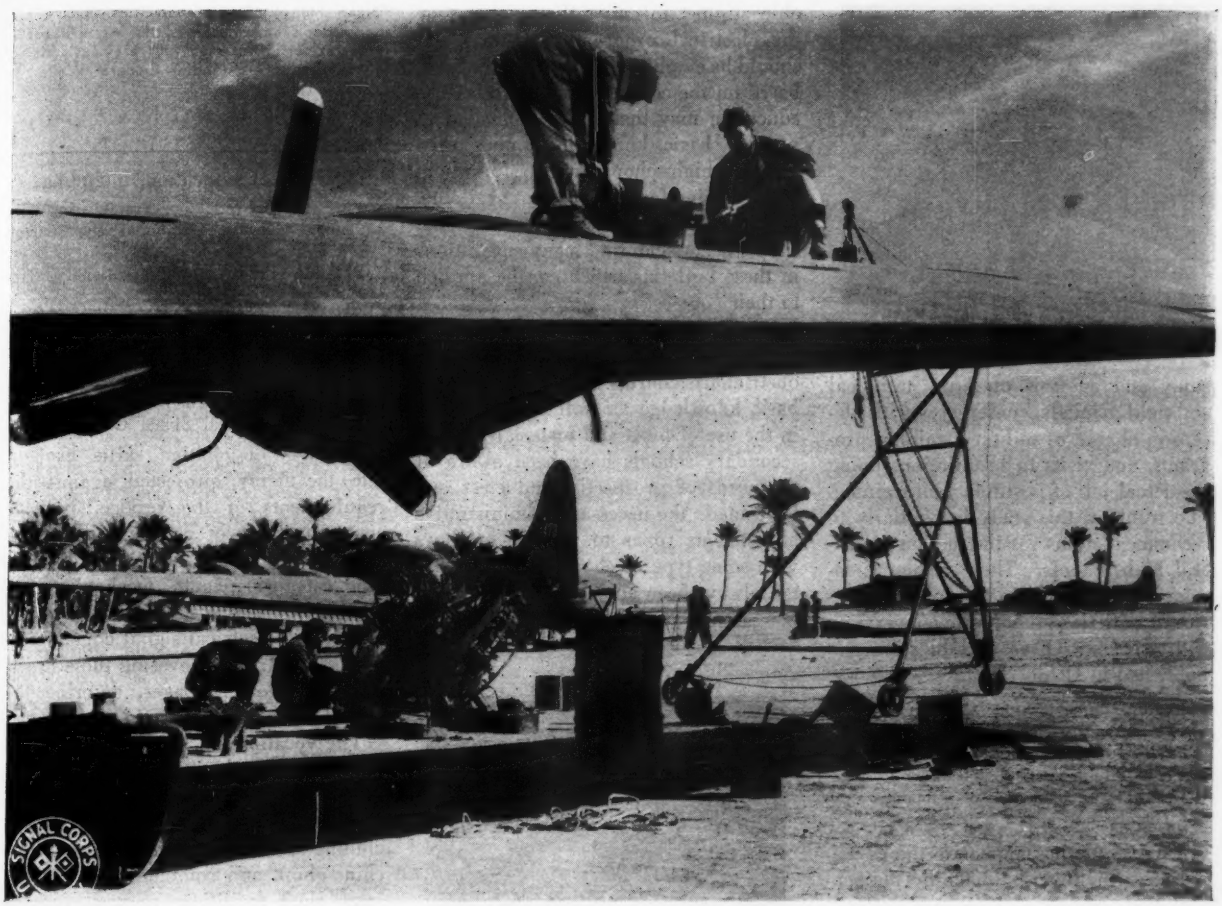


Skills taught in school shops today will lead to victory tomorrow.

School-Shop Training for Military Jobs

BY

Major Ralph Wenrich

This article gives an overall picture of preinduction training, its objectives and achievements to date which will help achieve an earlier victory. Major Wenrich is Chief, Preinduction Training Section, Office of the Director of Military Training, Army Service Forces, Washington, D. C., and is on military leave from the Pennsylvania State Department of Public Instruction as State Adviser for Trade and Industrial Education.

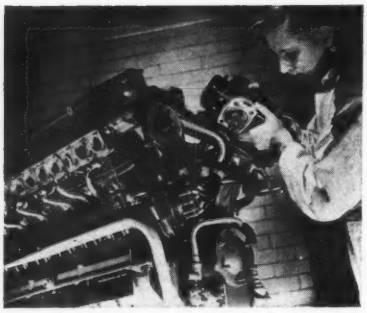
ALL soldiers must be taught to fight, but, in addition, most soldiers must be taught to perform some military job. Since many of these military jobs are similar to civilian occupations, men who have had experience in the skilled trades in civilian life bring with them into the Army skills immediately useful. The result is a saving of training time for the Army and usually more rapid advancement for those so qualified.

Young men attending high school have very little time between high-school graduation and induction to acquire such experience; therefore, they must rely almost wholly on the occupational training which they receive in the school shops. It is the patriotic duty of all school administrators to endeavor to provide for every boy some shop training prior to induction. It is incumbent on each shop teacher to review and revise, if necessary, his course of study so as to include that type of instruction most beneficial to a future soldier.

Industrial-arts and vocational teachers and administrators have an obligation to their male students which cannot be dismissed by the assumption that the instruction provided during past years is adequate in preparing boys for military service. "Business as usual" will not give boys the needed foundation for postinduction training. Curriculums should be evaluated against the needs of boys who are destined for military service on graduation. Courses of study should be examined with a view to eliminating unessential subject matter and placing proper emphasis on those units which are most important in time of war. The articles on preinduction training in this issue of SCHOOL SHOP, by shop teachers and administrators who have done an outstanding job of preinduction shop training, are intended to give a basis for evaluation of preinduction training programs in vocational and industrial-arts shops.

Science and Industrial Arts

The Preinduction Training Branch of the War Department determined the needs of the Army through intensive



Preinduction training in—

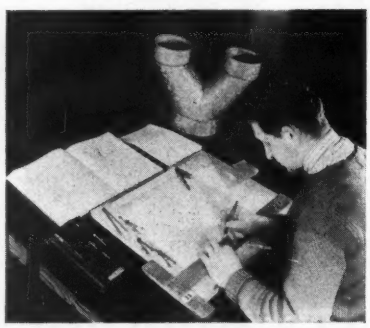
study and analysis of Army technical and field manuals, conferences with officers in charge of military training programs, and visits to installations doing the actual job of postinduction training. The result of this study led initially to recommendations for instruction in general high schools. These recommendations are contained in the following series of bulletins prepared in cooperation with the U. S. Office of Education and published in October 1942:

PIT 101—Fundamentals of Electricity
PIT 102—Fundamentals of Machines
PIT 103—Fundamentals of Shopwork
PIT 201—Fundamentals of Radio
PIT 202—Fundamentals of Automotive Mechanics

These bulletins emphasize the contributions which can be made by the general high schools through a functional type of science instruction. It is not intended that schools with well-equipped industrial-arts and vocational shops should substitute the work outlined in these bulletins for what they have been doing. Rather, it is thought that schools can make their science education more practical and useful to boys for whom shop facilities are not available by introducing applied laboratory exercises with military significance.

The topics listed above were suggested by the fact that this is a mechanized war which can only be won by keeping our war machines in operation and maintaining an efficient system of communication. If a boy is familiar with the principles of machines and the fundamentals of auto mechanics, he is prepared for postinduction instruction in a wide variety of jobs which need to be done in mobile warfare. On the other hand, if a boy's interests lie in the field of electricity he should be encouraged to study the fundamentals of electricity, followed by a study of the fundamentals of radio, and thereby be prepared for a large family of Army jobs in the field of communications. Fundamentals of shopwork, it was thought, would be a valuable adjunct to either the machines or the electrical program of studies. It should be emphasized that these outlines, based on the contribution which science education may make, were intended to provide basic knowledge rather than skills to high-school students for whom shop training facilities are not available. However, industrial-arts and vocational shop teachers can find many suggestions in these bulletins which can be applied to their courses.

Several hundred thousand students are enrolled annually in high-school industrial-arts courses which are providing basic knowledge as well as basic skill in the use of tools and materials. Many secondary schools have been aware of the needs of prospective inductees and have made the necessary administrative adjustments so as to provide *all* boys with some type of shopwork. This has not always been an easy matter, since it has often meant taking over school-shop facilities which were intended originally



school shops will give—

for industrial arts on the lower grade levels or it has meant turning the science laboratory into a workshop or in some cases it has been necessary to use commercial shops in the community. Industrial-arts facilities should be used to their maximum capacity so as to provide more boys with a sound foundation for training in a military specialty. Many high schools with inadequate shop facilities have solved the problem by a cooperative arrangement with nearby vocational schools or war-production training shops; others have planned, in cooperation with industry, a work-study program enabling the student to learn on the job, add to his income, and aid in the war effort through production.

Vocational Industrial Education

The original series of preinduction training bulletins was followed by the series on preinduction vocational training, prepared in cooperation with the U. S. Office of Education, including:

PIT 330—Pre-Induction Training in Vocational Schools, Vocational Departments and Trade Schools
PIT 331—Pre-Induction Vocational Training in Auto Mechanics
PIT 332—Pre-Induction Vocational Training in Machine Shop Practice
PIT 333—Pre-Induction Vocational Training in Aircraft Maintenance
PIT 334—Pre-Induction Vocational Training in Electrical Signal Communication

"Since many military specialties involve the use of tools and machines, the Army needs a large proportion of men with previous training in trade skills."—Brigadier General Walter L. Weible, Director of Military Training, Army Service Forces.

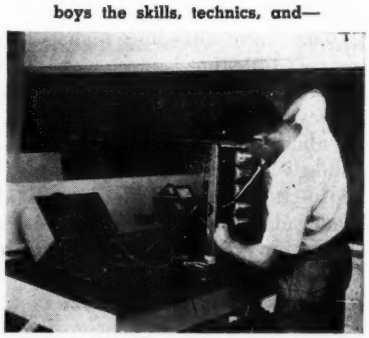
★ ★ ★ ★ ★

Analysis of civilian skills brought into the Army, projected against the requirements of the service, indicate acute shortages of certain skills. The principal shortages fall into four general categories: auto mechanics, machine-shop practice, aircraft maintenance, and electrical signal communication. The articles covering these areas, on the following pages, describe the work being done by certain schools.

The vocational schools of the nation have an annual enrolment of over a quarter million secondary-school students in regular day-school courses, including auto mechanics, aviation, machine shop, and communications. The same shop facilities are used for the training of over a third of a million men annually in part-time courses. Men who complete these courses are exceptionally well qualified for further postinduction training for one of many military specialties. The U. S. Office of Education Misc. 3084, issued by Dr. J. C. Wright, Assistant Commissioner for Vocational Education, defines the use of Smith-Hughes and George-Deen funds for preinduction vocational training.

In addition to the preinduction training provided in regularly established courses described above, the public schools of the nation have trained since July, 1940, over two and a half million persons in war production preemploy-

boys the skills, technics, and—



"The public vocational schools of the Nation are to be congratulated on the opportunities which they have provided for boys to secure training in specialized skills useful in the armed forces."—J. C. Wright, Assistant U. S. Commissioner for Vocational Education.

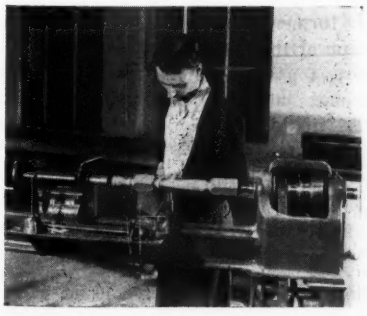
★ ★ ★ ★ ★

ment courses and nearly three and one-half million in supplementary courses. This training, even though primarily intended as preparation for up-grading in industry, has in many instances served to train men who were later called to duty in the Armed Forces. This additional outcome, namely, preinduction training, was recognized and endorsed by the U. S. Office of Education in VE-ND Misc. 3665, issued by Mr. L. S. Hawkins, Director of Vocational Training for War Production Workers.

A study of war production trainees by age groups indicates that approximately 75 percent were of inductible age at the completion of their training. This study also revealed the fact that three out of four preemployment trainees were pursuing instruction which was directly applicable to military jobs and nearly half of the supplementary trainees were learning skills which could be used in military specialties. As a result of sample studies made during 1943 it was found that 13.3 percent of former preemployment trainees and 16.6 per cent of supplementary trainees were serving in the Armed Forces. In terms of numbers of men, this would indicate that approximately a million men in the Armed Forces on December 31, 1943, had the benefit of this type of vocational training as preparation for military service. It is reasonable to assume that since that time many more have been inducted, especially in view of recent changes in selective service policy regarding occupational deferment.

Vocational schools, vocational departments, and trade schools have made a contribution toward winning the war which cannot be estimated only in terms of numbers trained. The quality of the training which has produced skilled workmen possessing desirable work habits has contributed immeasurably to a more efficient Army.

knowledge they must have to be—

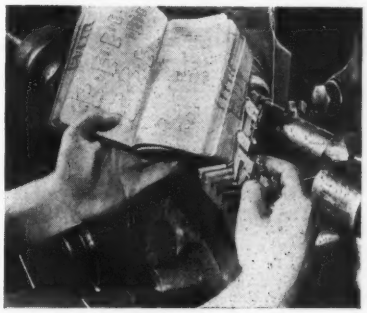


Recommendations

In planning a program of shop instruction for youth soon to be inducted, the following recommendations should be kept clearly in mind:

1. Job-skill training prior to induction should be considered as preparation for further training after the man has entered the service. The Army requires a period of intensive postinduction training in order to meet its special needs and standards. However, preinduction training can do much to help shorten the period of postinduction instruction, raise the level of competency, further the progress of the individual with the Army, and ultimately reduce casualties.

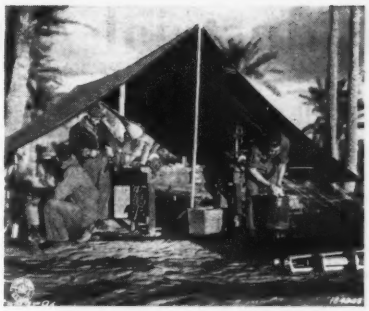
2. The War Department is not concerned with the type of school in which the preinduction training is given. Industrial preinduction training may be offered during the day or in the evening, in general high schools, or in trade schools. Any course that provides an adequate amount of shop training in specific skills required by an Army specialist job will be of value.



efficient members of the military forces—

3. Special emphasis should be given to training in the skillful use of hand tools since most of the soldiers' work is done in the field without elaborate equipment and under adverse conditions. Development of skill in the use of machines should be undertaken only after the student has attained a high degree of skill in the use of hand tools.

4. High standards of attainment are essential in preinduction training. Whatever is learned should be learned well. The requirements on the battlefield are exacting; there is no time to reflect as to the method of procedure once taught by the instructor; it is necessary for the soldier to perform automatically. Therefore, accuracy, speed, and confidence should be emphasized as important outcomes of instruction. Attention to detail and willingness to go beyond ordinary expectation in doing the job properly are valued attitudes for the Army. A seemingly minor detail neglected or an attitude of "that's good enough" may cost the lives of men.



who will bring victory soon!

5. It is important that the student receive a certificate indicating exactly the preinduction work he has completed. Such a record is of value to the student and to the persons who may be responsible for his Army assignment and postinduction training. It is recommended, therefore, that Form 114 of the Federal Security Agency, U. S. Office of Education, or its equivalent, be used for this purpose.

6. In addition to the need for training in preparation for a military job, schools should keep in mind the other needs of the prospective soldier. Every soldier must be physically fit to fight and live; he should have command of basic language and mathematical skills; he should understand the issues of the war and the nature of military life.

7. A sound program of preinduction training should develop leadership qualities in future inductees. One of the gravest needs is for young men capable of becoming good corporals and sergeants as well as for commissioned officers. Anything that a boy can do in school to develop and exercise skill in this respect will enhance his later usefulness in the service. The school shop provides an ideal setting for training in leadership.

The preinduction training provided through industrial arts and vocational shop courses has already saved the Army millions of man-hours in the instruction of its new soldiers. Shop teachers and administrators should continue their efforts until every boy leaving or graduating from high school has the benefit of a good foundation in occupational skills useful in the Armed Forces of the Nation.

Industrial Arts Prepares for Army Service

BY *Roy G. Fales*

The service record of industrial arts in New York State to former students now in the armed forces is readily apparent from the evidence presented by the author who is Supervisor of Industrial Arts, New York State Department of Education.

THE public school is obligated to prepare the youth of the country to cope with the problems which they are likely to face. The public schools have presented much of the general education which is needed by the serviceman of today. Some of this material may have to be modified in order to make it applicable to present conditions.

The public school can provide much of the general background which is needed by those who are entering the service. It cannot, however, furnish the vocational education which is provided for specialists. As a rule, the industrial arts department in the public schools does not have the equipment, the time schedule, or the personnel to provide specialized vocational courses.

Quotations from Letters of Servicemen

In an attempt to evaluate the postinduction benefits received from the industrial arts work offered in New York State, several teachers were requested to submit any evidence in their possession of instances where their courses had benefited high-school pupils who are now in the service. This was done in order to avoid the necessity of assuming that benefits were accumulated for military service and in an effort to obtain specific evidence. The following comments are excerpts taken from letters which were sent to high-school industrial-arts teachers by some of their boys who had been inducted. They explain the attitudes and feelings of these men.

Some of the statements made by former students in industrial-arts shops in the state of New York are:

"The work in metal and machine shop have been of direct assistance in obtaining a machinist rating."

"What I learned in the junior aviation class has helped me a great deal, especially the meteorology, navigation, and mathematics."

"If it had not been for the experience in your class, I would not have obtained the marks that have sent me to the Naval Air Technical Training Center. I am a candidate for the aviation machinist's mate and that is just what I want."

"Please send me a record of my accumulated hours in the junior aviation class. I am a candidate for the engine mechanic course and this record will help me in getting my appointment."

"The school here at (censored) covers much the same work we covered in shop, the only difference being that we work on more powerful and modern engines."

"(Censored) I received an excellent score on my mechanical test; thanks to my training in auto mechanics and shop."

"The things which I learned while in school such as screws, electrical symbols, mechanical drafting, etc., were of great help to me in the basic phase of airplanes. I am sure that the knowledge which I acquired while working on motors in your auto shop will help me a great deal when we begin work on airplane engines."

"I have found that my shop classes came in very handy for me in the armed services. I have found that my experience in auto shop aided me materially on my classification tests. In general, boys who have had these shop courses come out ahead on their tests."

"My previous work in shop aided me in working my way up to be a crew chief. I have complete charge of one of the (censored) planes."

"I have learned how to handle tools and read drawings because of auto shop and mechanical drawing."

"I have just completed a course in machine shop and received good marks. It was pretty easy for me because I learned quite a bit about it in your shop."

"Ability to draw plans and read blueprints will be of tremendous help."

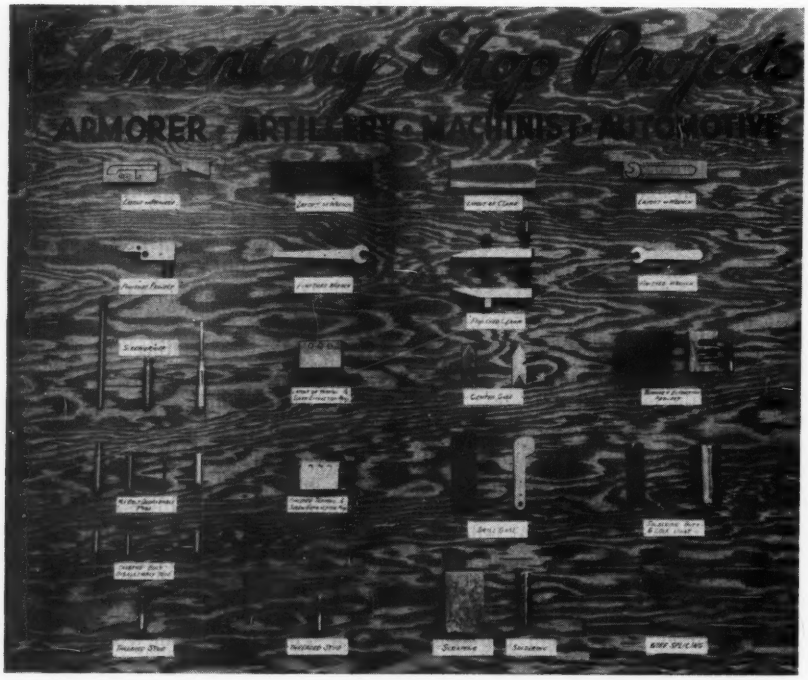
A number of supervisors and teachers have written regarding the experiences of former students. Quotations from some of their letters follow:

"Took general woodwork. Wrote that shop training gave him his rating in minimum time."

"Took all shops; wood, metal, auto. Gave him a good training so that he rated high on mechanical aptitude and got into maintenance and repair, Motorized Division."

"Industrial-arts training encouraged him to take up engineering in college and caused him to seek engineering work in the Army. He discovered his special interest in the internal

These elementary shop projects are part of the regular shop training at the Ordnance Replacement Training Center, Aberdeen Proving Ground, Maryland.



combustion engine while working in the industrial-arts classes."

"The encouragement of his industrial-arts instructors gave him the initial incentive and support which caused him to elect and work through an engineering course and finally choose flying as his goal in the Army."

The exploratory and guidance objectives claimed for industrial arts are well illustrated in many of the above excerpts. The students are given an opportunity to experience many different types of work in the high-school industrial-arts shops. In sampling these various fields, they are given the basic experiences in several types of work leading to a possible specialization. Knowing what they want to specialize in when the time comes to make a decision indicates that they have been provided with many types of work and properly guided through those fields. Their own interests, abilities, and attitudes toward industrial occupations have been crystallized. Satisfactory adjustment is made possible.

Meeting the Needs of the Armed Forces

Pupils enrolled in industrial-arts courses in the senior high school should be well informed regarding the content outlined in the preinduction training course bulletins numbered as follows:

PIT 331—*Automotive Mechanics*
PIT 332—*Machine Shop Practice*
PIT 333—*Aircraft Maintenance*
PIT 334—*Electrical Signal Communications*

These bulletins, issued by the War Department, contain the type of content which can and should be presented to high-school youth both as preservice education and education for living in a mechanical age. On examination of these courses it is obvious that industrial-arts shops are not equipped to provide intensive training in the specialties defined by the War Department. There are, however, many thousands of industrial-arts shops now operating in senior high schools in the country which can make and are making a distinct contribution in the way of general mechanical education which will aid their pupils when they are compelled to make their adjustments in a mechanized Army or Navy. Pupils who can be given courses in carpentry, automobile mechanics, aviation, machine-shop work, electricity, printing, painting and camouflage, photography, sheetmetal work, and many other types of shopwork are likely to be able to find a type of military work in which they can use their acquired abilities. A foundation of acquaintance with mechanical processes is an adequate base on which to build specialized training courses.

During the last three years, much emphasis has been placed on the value of mathematics and science courses. Little has been said about the necessity of being able to transfer knowledge into action. Industrial-arts teachers and shops can provide a sound and thorough background in the use of tools and materials of industry which are similar in many ways to the materials and implements of warfare. If the problem of providing the best preparation for inductees is faced squarely, mathematics, science, and the mechanical work of the industrial-arts shop will be more closely related with a view to sending to the military forces boys who are able to transform their mathematical and scientific knowledge into action intelligently and with facility.

There is little difference between bench metalwork in the Southwestern High School, Detroit, Michigan, and at the Ordnance Replacement Training Center, Aberdeen Proving Ground, Maryland. Boys who already possess the skills these soldiers are learning have a head start.

Massachusetts Schools Cooperate to Give Preinduction Training

BY *R. O. Small*

A unique cooperative arrangement has been set up in Massachusetts whereby students in general high schools are given preinduction training in the trade schools. R. O. Small is Associate Director of Vocational Education for Massachusetts.

COMMISSIONER STUDEBAKER launched the Victory Corps program late in the summer of 1942. Massachusetts high schools responded to the appeal. Old courses were adapted, practical arts courses were revamped, and new courses were adopted, which contributed much to the war effort. Their enrollees have joined the services better prepared to enter on the varied regimens of training.

When this program was launched in the high schools, the vocational schools were all but swamped by specific war-production training and the regular classes. Even so, their contribution through these regular classes has been very considerable.

With a shift to in-plant training for paid employees, the demand for war-production training in school classes decreased. The demand for the pupils in employment, enlistment, or induction have increased. The vocational schools now have space, equipment, and teachers available and can devote particular attention, in cooperation with the general high schools, to supplementary training in short shop courses for high-school boys over 16, while they continue their general education until induction at the age of 18. Adults could also be given preinduction training.

The Appeal

The assistance that can be given to the Army by schools at the secondary level through such cooperation is "high-lighted" by the appeal concisely stated below:

1. Ninety-one of 100 inductees must be trained as mechanical specialists.

2. Only 18 of 100 inductees now come with skills which fit them for the mechanical jobs they will be called on to fill in the Army. Lowering the age of inductees further decreases this number.

3. The Army must completely train the other 73 or more inductees.

4. Through special, short, in-school shop courses boys 16-18 can acquire valuable elements of the needed special skills.

5. Through this acquirement millions of man-hours of training may be saved, the Army's training load reduced, and the end of the war hastened.

6. In this technical-mechanical war these courses can help to save many lives.

In October, 1943, State Commissioner of Education Julius E. Warren, responding to this appeal from the First Service Command chief, Major General Sherman Miles, through Captain Frederick A. Zehrer, appointed a representative statewide committee, advisory to him on establishment of cooperative high school-vocational school short shop courses for potential inductees 16-18 in private or public secondary schools, or out of school.

The Committee

The Advisory Committee includes a member from these groups: The superintendents of schools, the industrial-arts instructors, the high-school principals, the state vocational association, and the vocational school directors.

In 1942, while superintendent of schools in Newton, Commissioner Warren had established such courses. He invited the principal of the Newton High School, and the director of Newton Vocational School, the director of training for the First Service Command, and the chairman of the superintendents' War Council Committee to the assistance of the above committee as special consultants.

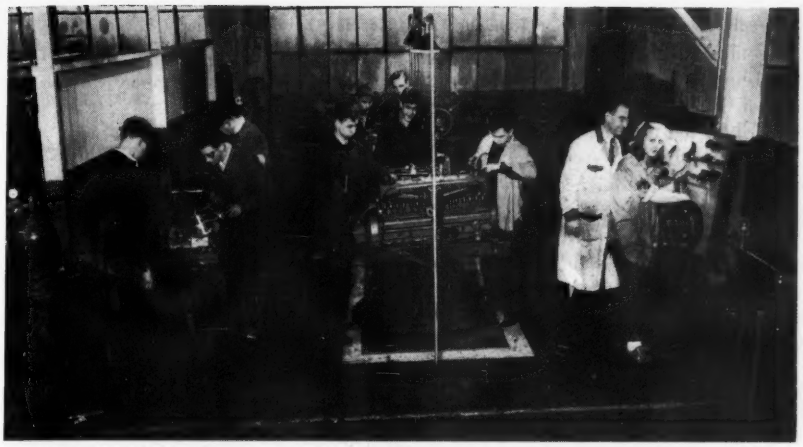
As Chairman, Commissioner Warren uses as an administrative office staff unit: the director, and supervisor of secondary schools; the director and industrial supervisor of vocational schools; and the supervisor of vocational guidance.

Under these auspices a plan for cooperative courses has been devised and carried to every section of the state. This plan has successfully enlisted the active support of educational groups. Special courses with vocational schools as area centers are established. The ground work has been well set. Further development is promising.

Present Results

From sporadic and uncoordinated efforts, there is now a lively and healthy interest throughout the entire Commonwealth in a comprehensive plan for these cooperative courses. Reports as of March 15 show them to involve 37 high

Boys from Boston Latin School, first public school in America, established in 1635, go from Latin classes to vocational school radio communications classes in the shop housed in Boston Teachers College.



Preinductees at the Newton, Mass., Trade School answer the call of the Army to come to the induction center fortified with knowledge and skills in a field useful in the Army. Nancy Postal, potential WAC, works in the auto shop with boys soon to be inducted.

schools in 30 cities and towns enrolling over 1100 high-school pupils. With the opening of schools in September, over 20 others may be established. Summer courses will be organized as demand arises.

While the present emphasis is on shop courses, the next step will be coordination of all other Victory Corps programs. Fairness to the boys involved requires that this plan be carefully devised for broad educational needs as well as preparation in specialized vocational service. Guidance must play an important part.

Some Reservations

We can say that school principals have accepted the righteousness of the plan. They still approach the implementing of it with varying degrees of reservation:

1. As to the essentiality of specific shop programs for all of their pupils because they feel that development of brain power rather than brawn and special skills is the most important consideration: With proper coordination and planning, both ends may be achieved. This war will be won by fighting with both equipments.

2. As to the interruption of the essential college preparatory programs: Without abandoning this ideal, a new consideration of the essentials is in progress. Witness the plan for induction of seventeen-year-olds and their training at the colleges. Speaking of returning veterans wishing to enter college, President Conant of Harvard says: "In selecting our students we should endeavor to measure true capacity and promise . . . not base our decisions merely on . . . previous academic training or . . . conventional credits." To preserve this nation and what goes with it, we must win this war—the sooner the better. To this end we must agree that business as usual is out for the duration for all of us and all of our activities.

3. As to the mechanics of an organization which will implement the program and yet preserve the integrity of respective groups: Give it a trial. Make it a truly cooperative program between the general high school and the vocational school. You will be surprised to find how little of this reservation really applies. The high-school pupils while in the vocational schools are enrolled high-school boys receiving a service in these courses which counts for diploma credits. In last analysis the attitudes of the boys themselves is the deciding factor.

This proposal counters the settled reason which many of them have for being in school. They have scant understanding of its values and need. Employment opportunities now so plentiful bid for their unoccupied time; this proposal may interfere.

A carefully planned program of informing the boys is necessary.

Certain Suggestions

The content of the courses may be adapted as needed from outlines found in PIT pamphlets provided by the War Department through the U. S. Office of Education and/or the War-Production Training courses conducted in cooperation with the War Manpower Commission.

Classes may be held as found expedient at any time: during in-school time, in the afternoon, or even in the evening.

The high schools should—

Release youth from the regular programs for preinduction training when and to the extent feasible:

a) Next school year and succeeding years, beginning in September and lasting throughout the year, organize cooperative shop courses for those 16-18.

b) Organize full-time preinduction training summer courses.

c) Beginning in February, 1945, transfer to shop courses on full time

Pvt. Joseph Bingelis, radio operator and generator man, and T/5 Harold Angell, operator of receiver and transmitter set, are at work on an island in the New Georgia group in the South Pacific. Not long ago they were high-school students.

certain youth (17-18 group), without loss of high-school credit.

"Preinduction (vocational training) courses should have the immediate and generous cooperation of every high and vocational school in the land," and that of other agencies with available facilities.

Preinduction training "should be accorded a full measure of academic recognition and prestige."

Adopt the Army slogan: "Be sure that no American soldier is killed or wounded because you failed . . . to (help to) provide him with adequate training."

Credit Given for Preinduction Training

By official act of the War Department, all preinduction training will become part of his military record when the boy is inducted into the Army.

Youth (and adults) completing preinduction courses will be given special official recognition. Form 114 is used for the vocational record; Form EES, for the general educational record. These records should be deposited with local selective service boards for delivery to induction stations and reception centers. These cards will become part of their service records.

"No boy between 16 and 18 can afford to neglect the opportunities to prepare himself for more effective service in the armed forces."—Professor Thomas Diamond, University of Michigan.

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The Courses—Time Arrangements

Emphasis is being placed on machine shop, auto mechanics, electrical work, radio and airplane: courses which the Army counts most fundamental. Of them Major General Miles has stated: "No single item of training and experience" is of greater importance to these young inductees.

While we have a wide range of length of courses, we are possibly crystallizing our belief and practice thereon. For ease of cooperation the eight-week period of 30 hours per week, entirely devoted to shop courses and definitely related work, appears to be the best proposal. This organization affords 240 clock-hours of shop training. In a 40-week school year it affords opportunity for five different groups of 15 boys each and yields an appreciable amount of day-time vocational training, while in the same school year these boys receive 32 weeks of regular high-school instruction.

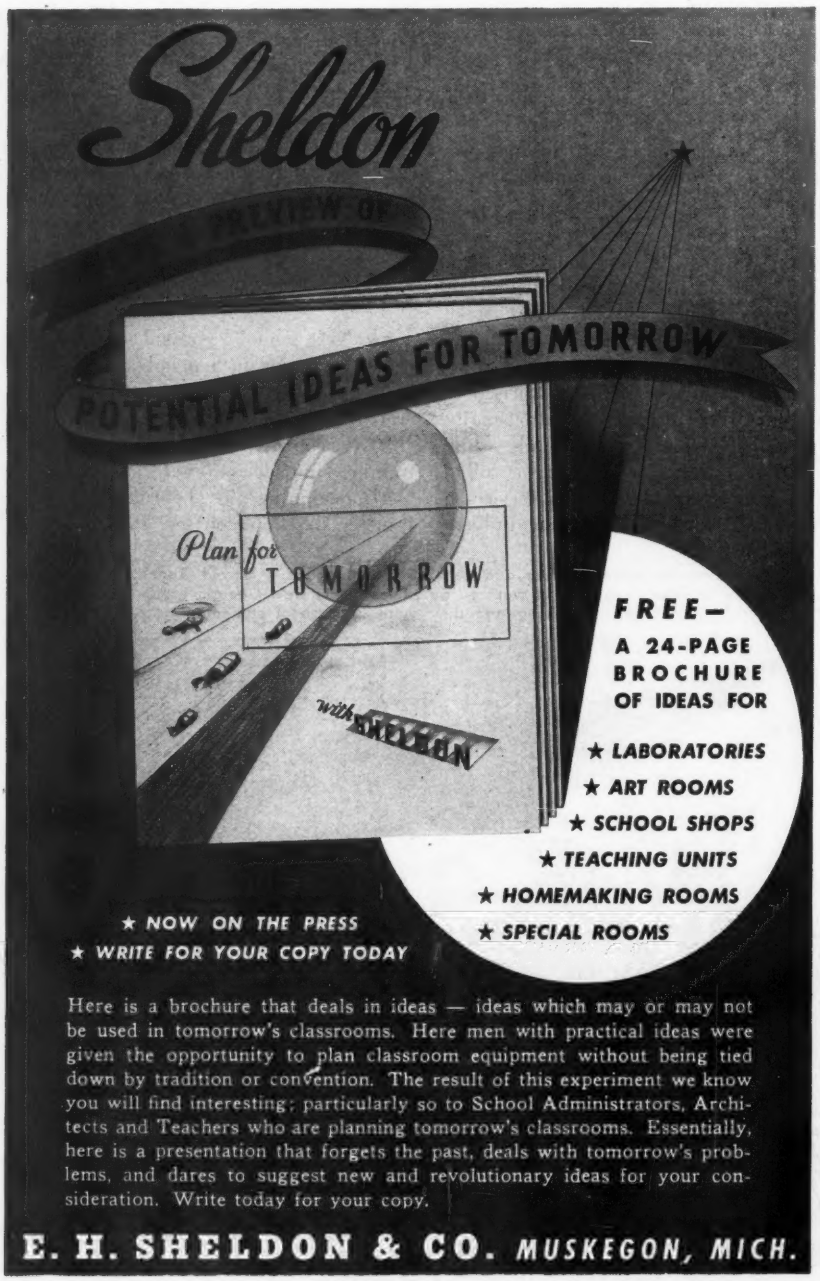
The part-time (alternating groups) organization is being used. Nonresidents from smaller adjacent towns are being reached.

I hesitate to name specific schools. All schools are doing well. I am, however, suggesting that those interested could get special detailed help from any or all of the following cities and towns. For a school system in:

1. A large city: Boston.
2. A medium sized city: Newton, Medford, Pittsfield, Haverhill, and Chicopee.
3. A smaller city: Beverly, Leominster, and Attleboro.
4. A large town: Southbridge, Greenfield, and Framingham.
5. A small town: Hyannis (Barnstable), Dighton.

Conclusion

We have responded to the Army's call for assistance. We accept the slogan "Youth's battle station is in the school." We have adopted the idea that our boys may be kept in school and also be given important preinduction training which will serve them well in preparing for the specialized jobs to which they will be assigned when they embark on the great mission to which they are destined—may indeed be a dominant factor in bringing them safely home.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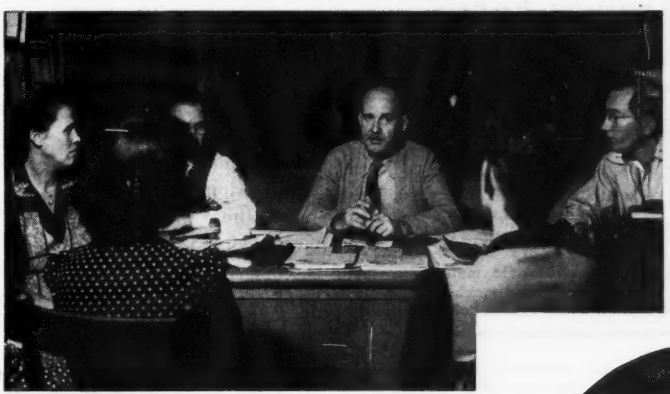

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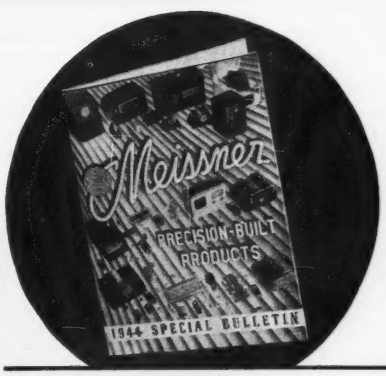

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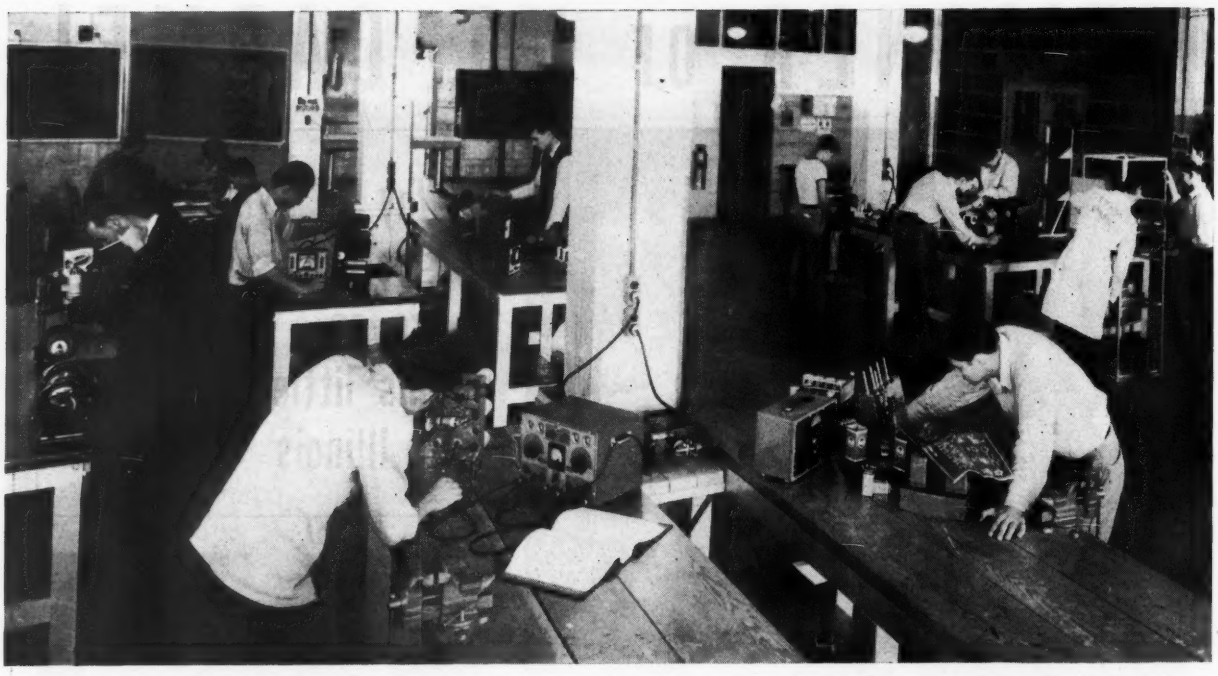

View of the radio shop in the San Diego Vocational School. Note the excellent shop facilities and the study area in the background.

Streamlined Radio for Wartime Needs

BY *Francis Ferris*
AND *Charles Parker*

The armed forces are training thousands of men in radio. In San Diego the schools went to the armed forces for help and set up the course outlined here. The authors are both experienced radio men in industry and teach now at the San Diego, California, Vocational School.

DURING the past two years, a great change has come about in all fields of education but none has proved to be more adaptable to the pressure of war needs than the programs offered by the vocational schools. These schools, geared to occupational training, are well adapted to meet the wartime needs for preinduction courses.

Radio training in the San Diego Vocational High School and Junior College has been organized to meet the demands of the community, both civilian and military. In this school, the student is given an opportunity to develop skills and knowledge required in the field of radio. These include shop skills, trouble shooting, repair and maintenance, and construction of receivers, transmitters, and sound equipment.

The radio department is organized to meet the needs of the individual on the high-school, junior-college, and adult levels. The technical institute program offers training on the junior-college level; the unit day trade training is set up for high-school students in the 11th and 12th grades; trade preparatory and trade extension training courses are open to adults. All of these courses are set up in accordance with federal, state, and local community plans and policies.

When war was declared the Vocational School considered Uncle Sam its most important future employer. It immediately appointed a representative from the armed forces to the advisory committee of the radio department. His advice and counsel has been crystallized into the various training units which have aided those who have gone into the military services to adjust themselves to the task ahead. The most important elements of a four-year regular peacetime program have been selected to make up a streamlined course for wartime conditions.

These Army men are operating a "walkie-talkie" somewhere in the Hawaiian Islands.

The demand for radio men has been great since the expansion of the military forces. Electrical communications, in general, and radio communications, in particular, offer one of the best means for serious minded young men to advance rapidly after being inducted. A check on the boys who have taken this training shows that their advance to ratings is much more rapid than the average in their age groups. Prospective inductees and their parents have been quick to see the value of specialized training and have kept the classes filled, with a waiting list of those qualified to enter always on hand. Letters and visits from recent class members, telling of their experiences and successes, prove without a doubt the value of the school's

"The American Vocational Association, even before the outbreak of the war, encouraged and continues to encourage the vocational schools of this country and the industrial-arts shops in high schools to provide important basic preinduction training in preparation for military service. When and if an accurate record is prepared showing the extent of this preinduction training in our schools, it will become evident to all that the schools have again, in another way, made a most valuable and significant contribution to the war program."—L. H. Dennis, Executive Secretary, American Vocational Association.

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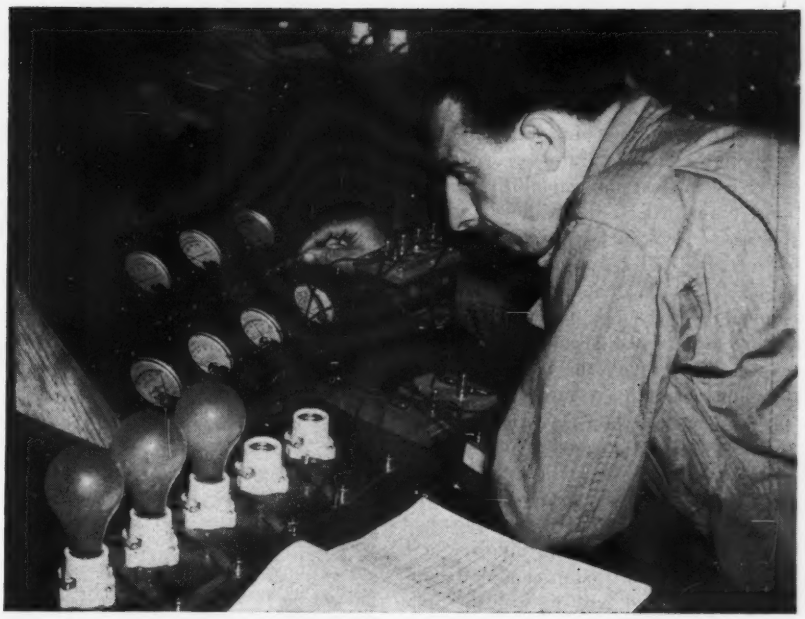
part in aiding the war effort. Graduates have found ready acceptance in a wide variety of war activities such as those of the Naval radio and sound laboratories, Naval air stations, aircraft industries, and private industries.

Experience has shown that a program which meets sound vocational standards for training in normal times requires very little modification to meet the conditions of the war emergency. To meet the needs of preinduction training, San Diego Vocational School has shortened the length of its regular radio course from two years to one. The maximum age of the boys enrolled in these preinduction classes is set by the drafting of all 18-year-old boys. Therefore all curriculums must be planned for the 17-year age group or for those even younger. The technical content of the course has been revised to meet the ability of the student and to cover essential features of radio communications. Shop skills and basic theory are emphasized to provide the student with a practical working knowledge of radio which includes service, maintenance, and the use of test equipment.

The more technical content of the regular radio course has been used in a curriculum for specialized men now in communications branches of the service. For example, the two-year junior-college curriculum has been adapted for a special class in radio materiel offered to meet the requirements of the Marine Corps. This training has been successfully carried on for the past two years.



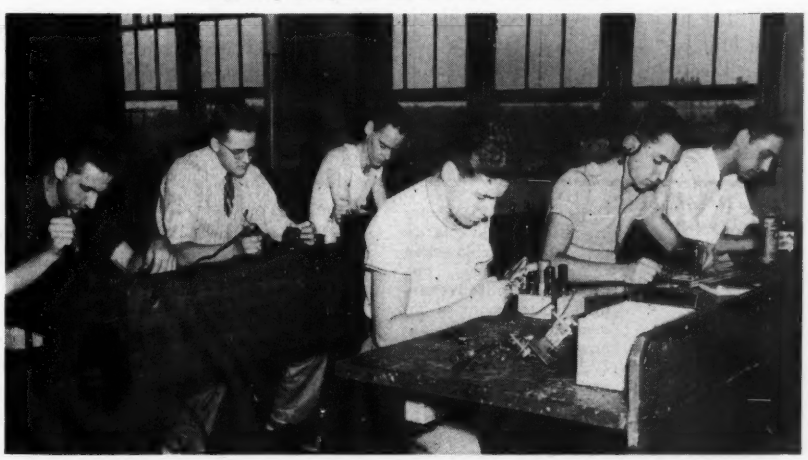
This Air Corps trainee is learning radio fundamentals. If he had preinduction training, he would not have to start from scratch.

In accordance with good vocational practice, actual jobs, rather than pseudo jobs, are used in all courses in order to give the student actual practice by simulating work conditions that will be met when he puts his training to practical use. Student interest is thus stimulated and pride in workmanship increased.

Many teaching aids are available. Various radio manufacturing companies have wall charts and teaching aids for classroom use which can be obtained free or at a small cost. Sound motion pictures, where the subject material is animated, are very effective in rapidly putting over such topics as elementary electricity and magnetism, basic radio theory, and operating principles of electronic tubes. The shop work is based on progressive steps where one job becomes the basis for the succeeding job. For example, a study of power supply is made. This is followed by work on a simple amplifier to which a tuning unit is added to complete the receiver. Again this stimulates interest by leading from one job to the next. It also avoids unnecessary duplication.

Today there is a pressing need for preinduction training. Tomorrow there will be an equally great need for the retraining of discharged men from the various divisions of the armed forces. Getting well prepared boys into military service is the immediate job of the school. Preparing them for a profitable and a well adjusted future will be the next big step. The public schools, particularly the vocational and trade schools, will bear the brunt of this readjustment. Never in the history of vocational and trade training have the schools had such an opportunity.

These students of preinduction radio in a Philadelphia high school are gaining skills and knowledge they will put to use in a few short months.



FOR help in preparing this special issue of SCHOOL SHOP, the editor is especially grateful to Major Ralph Wenrich, Chief Preinduction Training Branch, ASF; Professor Thomas Diamond, University of Michigan, Consulting Editor of SCHOOL SHOP; and Mr. William P. Loomis, Vocational Division, U. S. Office of Education, Washington, D. C.—*Lawrence W. Prakken.*

A School Machine Shop Goes to War

THE school machine shop is potentially able to train our youth to use his mechanical ability in the most urgent vocation—military service. The present conflict requires thousands of men for the operation, maintenance, and repair of war machines. Since our students are teen-age, they lack the time before induction to accumulate years of experience through the usual channels of apprenticeship training. Therefore, prewar machine-shop activities must be adapted to meet the needs of mechanized warfare.

At first this may seem difficult but the machine-shop instructor who has kept in close contact with industry and the urgent need for mechanically inclined personnel will have little difficulty in adapting his prewar training course to meet present-day conditions.

There are four main objectives every trainee must achieve if he is to be of the utmost value to his country:

1. The ability to master and put into practice certain manipulative skills;
2. The determination to do a real job whether the assignment is liked or disliked;
3. The accumulation of sufficient knowledge to correctly evaluate his own work;
4. The desire to be satisfied only when the accomplishment is a result of his best efforts.

These objectives are not beyond the reach of any machine shop.

In the field of mechanics certain manipulative skills are always necessary and, since the training period for the inductee is so short, only the most important of these principles may be taught. Because the training is streamlined, we try to make use of every practical learning device. Instruction according to T.W.I. methods has been invaluable. We emphasize one point—the individual. It is well, also, to realize that almost every trainee will do a tiptop job if he understands how.

One device we have found very helpful is the use of visual aids. A short moving picture can often take the place of hours of discussion and make a more lasting impression. There are also many new films available which show firsthand the part of machines in this war and the skills required to keep them moving.

Today, especially, our young men need to have the idea of discipline instilled into them because of military demands in this regard. The machine shop affords excellent opportunities for checking any deviations which are commonly referred to as "getting by." Through the understanding and use of precision measuring instruments, a workable definition of accuracy is presented and the individual is challenged to meet the standards set up by the shop instructor.

This student is taking a preinduction machine-shop course in the Philadelphia, Pa., schools.

During the past few years, we have used several methods in order to get the student in a state of readiness to do his best work. We have found the following to be very helpful:

1. Gain the confidence of the student.
2. Let him know you are trying to help him.
3. Treat him as an individual.
4. Never miss an opportunity to "pat him on the back."
5. Show his work to visitors while he is present.
6. Suggest he make some tool and present it to his father or mother.

If these suggestions are adhered to day after day, the students will develop confidence in themselves, pride in their work, and the respect of others. This will mean more to morale than any amount of individual coercion or newspaper publicity.

During peace, satisfactory repetitive operations are often the major criterions for workmanship; during war, knowledge plus ingenuity and determination become paramount.

We must not let our men go into service expecting to find a shop fully equipped and ready to operate for emergencies will arise where materials and parts are not always available. Yet all equipment must be kept in readiness. Therefore the young trainee must be taught to use whatever is at hand and to complete whatever is once begun. For instance, it is much easier to turn a center punch on a lathe and knurl it than it is to forge a piece of metal. Yet the harder way may sometimes be the only way and we must recognize this fact.

In this type of training, it is necessary to teach the correct use of hand tools and the importance of proper bench work, rather than concentrating on machine tools.

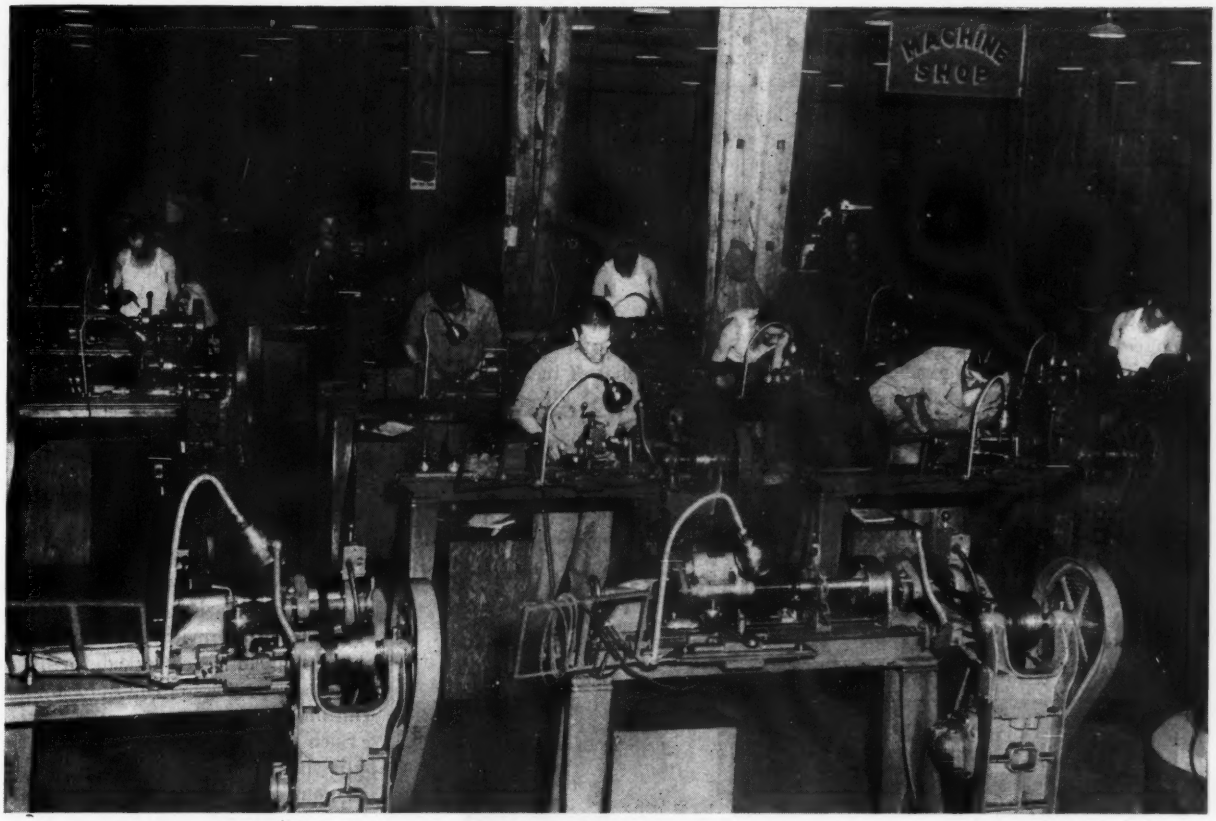
First of all, we require each new trainee to buy a tool box with a good padlock. He must keep his own key as this is one small way in which we begin teaching responsibility. He is then eager to possess some tools of his own. This is a good time to develop pride in ownership. Too, the making of a set of tools will give him an opportunity to learn more of the basic skills for machine-shop work. We have him make such tools as: center punch, prick punch, scriber, hammer, and screw driver. All of these are made from a good grade of water hardened tool steel and are forged, draw-filed, polished, tempered, tested, and repolished.

We then instruct him how to make a tool-post wrench for his lathe. By doing this he learns to lay out work. Next he grinds a piece of steel and makes a cutting tool for the lathe. After some practice in chucking pieces of work in the

BY *Harry L. André*

P I T

Objectives and technics are discussed in this article. The machine-shop course outlined has proved its effectiveness from the testimony of former students who are now servicemen. **Harry L. Andre is Machine-Shop Instructor and Evening School Coordinator, Stair Technical High School, Knoxville, Tennessee.**



Soldiers at the Ordnance Replacement Training Center, Aberdeen, Maryland, Proving Ground, receiving elementary machine-shop instruction. Mobile machine shops on trucks go close to the front lines while larger shops are maintained to the rear for repair of equipment.

lathe, he makes ferrules for a scriber and screw driver. We never allow a handle for a screw driver to be made of metal so we have him turn a wooden handle on the lathe.

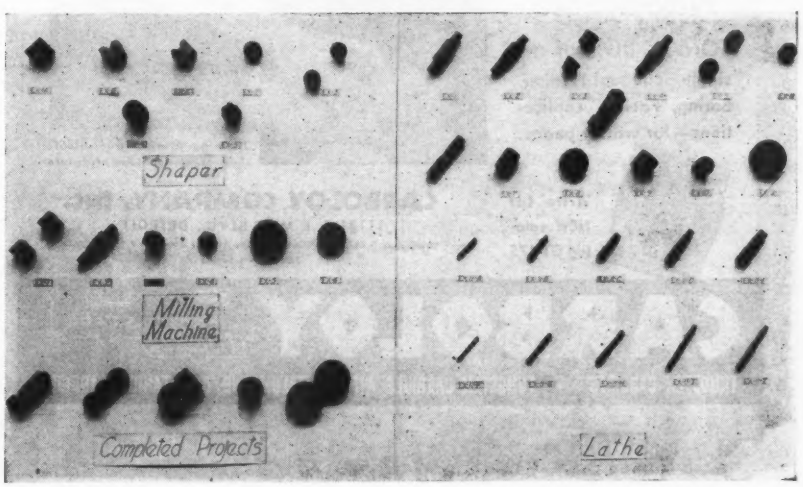
By this time he is permitted to turn pieces by holding them in the lathe chuck and measuring with a scale and calipers. He has then progressed enough to turn between centers and chase threads.

We often encourage him to go beyond this and make a 2" micrometer or "mike" to him. In most cases he is able to make his own taps and jigs for holding parts of the micrometer when machining. Of course, all of this work requires great accuracy in the use of precision measuring instruments and the micrometers, when completed, measure accurately to one ten-thousandth of an inch.

To illustrate the steps used in our shop, we will explain in detail one unit of work—the making of a center punch. Before any work is attempted, the dangers to be encountered are anticipated and trainees are cautioned to practice safety first. Next, the instructor gives a demonstration of how to make a center punch from ½" octagon steel. He forges the steel to acquaint the trainee with the proper way to heat the metal and the proper way to hold it on the anvil. Again he stresses safety by showing him the safe way to strike the metal with the hammer. He then shows him a finished center punch and calls attention to workmanship which is apparent in the shape, size, and finish. This becomes his guide.

The next important step is to give each student a chance to use his own initiative, insofar as possible, in making a center punch for himself. The first attempts are often inferior and discouraging. At this point the instructor should be liberal in his compliments yet he should insist on the highest standards. Clean competition among the various members of the group is always helpful. This will encourage each one to improve his own work until he is able to produce a center punch he is proud to

Examples of projects used in the training program at the Aberdeen Ordnance Replacement Training Center.



display. This may require each individual to make several center punches but the final satisfaction of a job well done will justify the time and materials used.

A quotation from a letter received from one of our former students will substantiate the effectiveness of this type of instruction. This student is now being trained for submarine service. He says, "I remember what you told me to do the first time I brought a half-done center punch to you. You said, 'Anything you do, do it right.' Only 12 men out of 120 get ratings. I want to be one of the 12." Needless to say, he is in the upper half of the 12.

Today most of the students enrolling in machine-shop courses are already somewhat aware of the advantages this type of training will afford them when they enter the armed forces. Some have a definite goal in mind while others vaguely believe the training will somehow enable them to be placed in the field of their choice.

From time to time during the past two years, our former students representing all branches of the service have visited us. We always give them an opportunity to talk to the entire class and specifically ask them how our training fits into the program and what we can do to make it more usable. The comments, without exception, have always been very stimulating and gratifying.

At least 95 percent of our former trainees, now engaged in military duties, write to us and they never fail to express appreciation for the fundamentals learned in our shop. A sailor "somewhere in the Pacific" writes, "I am a fireman 2/c and hoping to be advanced soon. I wish to tell you that if it hadn't been for the training I received under you at Stair Tech, I wouldn't be in line for advancement." Another serviceman, taking college training for four months says, "When we started to school it was just like Tech. We began by chipping, then filing; all benchwork for the first month. Boy, what you taught me is really coming in handy now. The class I'm in is mostly machinists with cards. Some of them have worked for 10 or more years but I sure can hold my own with them."

Such reports are very encouraging to both students and instructors. We believe our machine-shop training is making a worthwhile contribution to the war effort.

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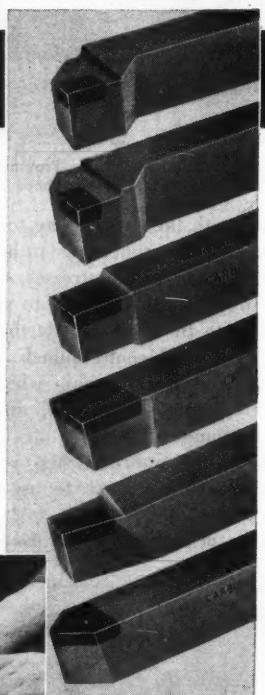

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THOSE wishing copies of the preinduction training bulletins mentioned in this issue of SCHOOL SHOP may secure them from the U. S. Office of Education, Washington 25, D.C., or from the Preinduction Training Officers in the various service commands who are also in a position to advise schools on training needs. Headquarters of the various service commands, with the states in each, follow:

First, 808 Commonwealth Ave., Boston 15, Mass.—Me., N.H., Vt., Mass., Conn., R.I.

Second, Governor's Island, New York City—N.Y., N.J., Dela.

Third, Keyser Bldg., Baltimore 2, Md.—Penna., Md., Va., D.C.

Fourth, Old Post Office Bldg., Atlanta, Ga.—Tenn., N.C., S.C., Fla., Miss., Ala., Ga.

Fifth, Fort Hays, Columbus, Ohio—Ind., Ohio, Ky., West Va.

Sixth, 20 North Wacker Dr., Chicago, Ill.—Wis., Ill., Mich.

Seventh, Federal Bldg., Omaha 2, Neb.—N.D., S.D., Neb., Kan., Colo., Minn., Ia., Mo., Wyo.

Eighth, Santa Fe Bldg., Dallas 2, Texas—N.M., Texas, Okla., Ark., La.

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Mail should be addressed to the Commanding General of the Service Command, attention Preinduction Training Officer.

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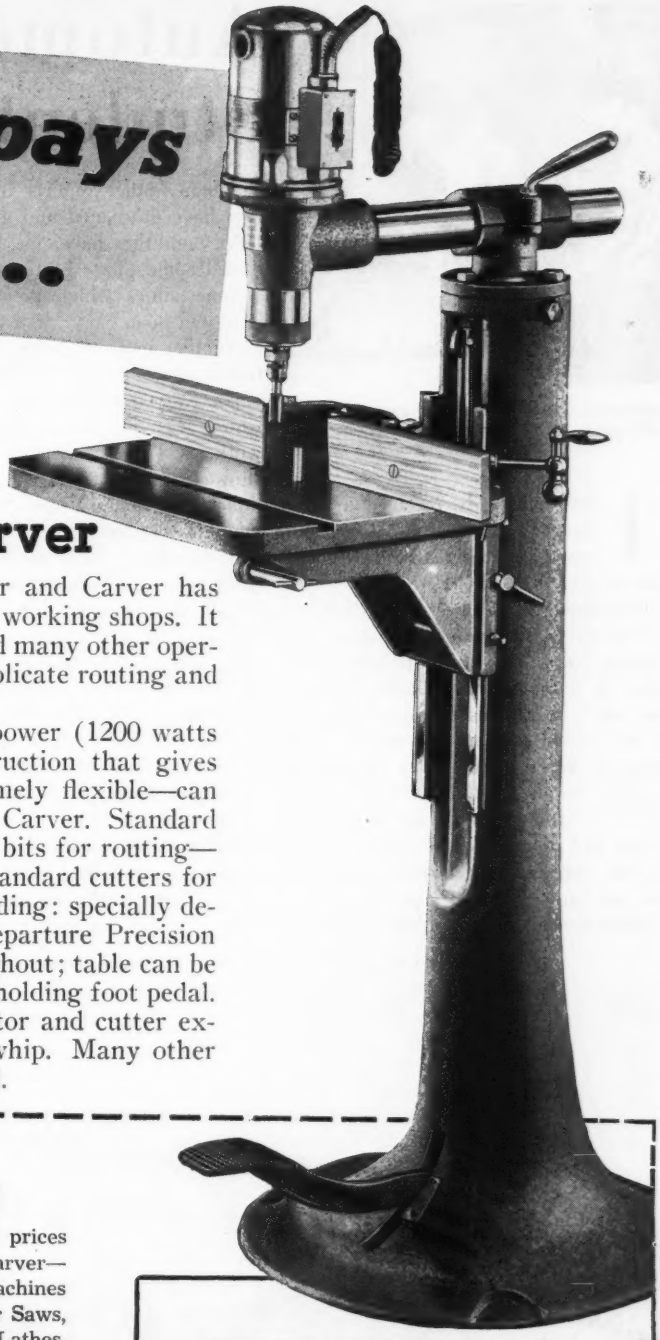

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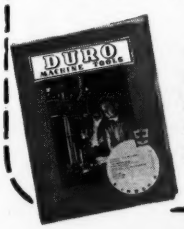

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Preinduction automotive mechanics students in Elizabeth, N.J. Note tie-in with army occupations listed on blackboard.

Automechanics Gives Students a Head Start

BY *I. T. Gilmer*

The modern army moves on wheels. The preinductee with a knowledge of automotive mechanics has a distinct advantage. The training program at Graham, Texas, is outlined here by I. T. Gilmer, Superintendent of Schools.

"I HAVE already received a promotion and I think I owe it mostly to the training you all gave me there in school . . ."

Unknowingly, Johnny was giving us our first report on our automotive mechanics class. He was a private, first class, in a motorized antiaircraft unit, and when he got his corporal's stripes he was proud of them and wrote us all about it. We read the letter in general assembly to all the students, for we were proud of Johnny. And we were also proud and pleased to get such a return on the training our school's automotive mechanics class had provided.

Since we got Johnny's letter we have had many other reports from students who have graduated and gone into the service and they have, one and all, mentioned some phase of their training in automechanics which they believe has benefited them.

Another incident gives a slightly different view of results obtained in this class. Katy Jane, one of several girls who took the automotive mechanics work, was an excellent student and showed great interest in all that was done. Her father owns a large garage and now, at the date of writing, Katy Jane has taken over the "front end" of the garage, the service station and tire-repair departments. For over a year she has done a "bang-up" job of running the place and tells us that the draft took all her dad's help so he drafted her. Drafted or not, she still feels, and so do we, that her work in the automotive mechanics class of 1943 helped her to take over when her country needed the men.

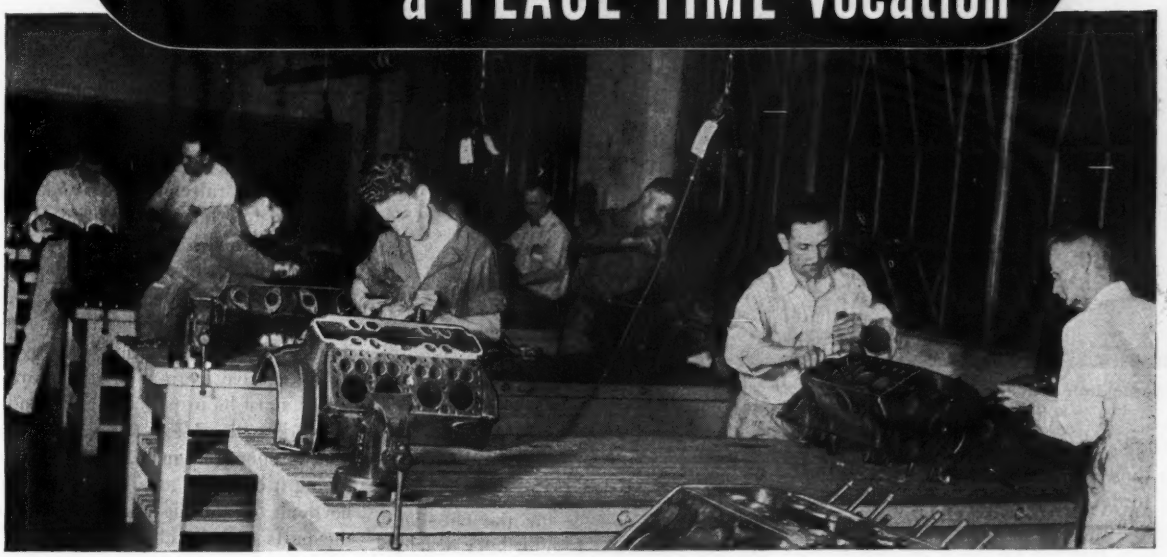
Other students who received the training have gone back to the farm and helped keep needed equipment repaired and operating for their families and for neighbors.

Our automotive mechanics class was organized in the spring of 1943 at the suggestion of the State Department of Education of Texas, Vocational Training Division. Mr. James R. D. Eddy, Director of the Vocational Training Division, supplied us with an excellent course outline designed to make such a course as profitable as possible for students who were to go into the armed forces.

We were also fortunate in having at hand a skilled mechanic, formerly shop foreman for one of the larger garages in town, who could take over the work of teaching the class.

Assembling motor vehicles from jeeps to four-ton trucks at a supply dump in Casablanca, North Africa.

WAR TIME emergency training a PEACE TIME vocation



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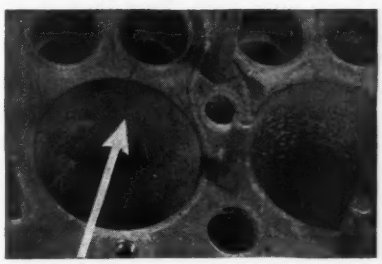
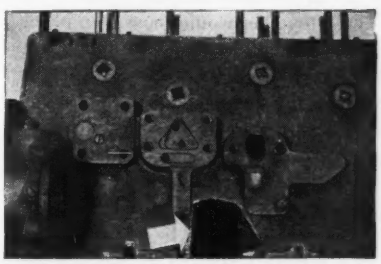


Heat crack in motor block



Hole in crankcase caused by thrown rod

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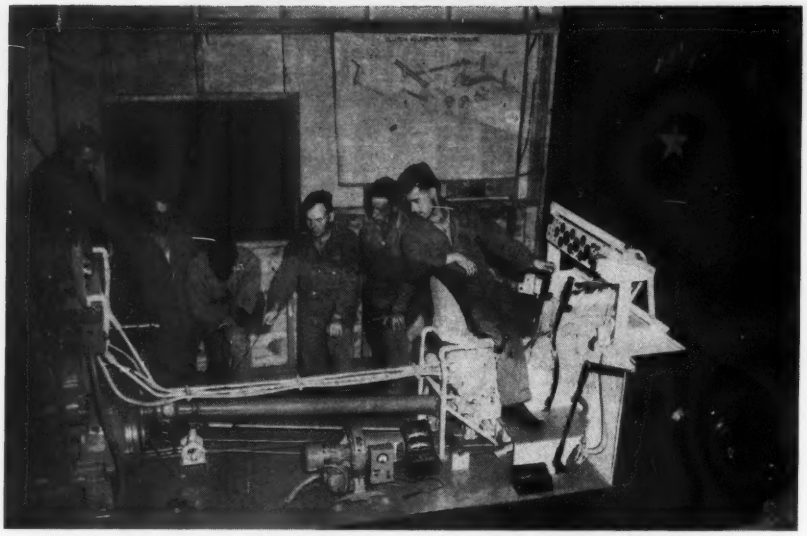

Sergeant instructing tank mechanics by use of a mock-up of a medium tank. The mock-up technic is used extensively by the armed forces in their training programs.

Enrolment was limited the first year to those students who seemed most likely to develop a later need for the training offered and, because of the excellent results fostered by this limitation of enrolment, selection of students has been continued this year.

In following the course outline given us by the state department, we made one thing our constant aim. Each student was taught, whenever possible, by doing. It was felt that all students would be better fitted if they knew "how to do it," rather than "how it should be done." With this basic philosophy of teaching in mind, we scoured the garages and junk yards for all kinds of old automotive equipment for the students to take apart and assemble. And finally, in the last weeks of the course, they reassembled, from the ground up, an old Chevrolet coupe.

Anyone who could have seen that class of 25 high-school students putting that old car together would have been pleased with their enthusiasm. And anyone who could have been there when they towed it down the road, pistons and bearings too tight for cranking, and watched those students trotting along beside that old car, almost breathless for fear it wouldn't start . . . well, it would probably have to be seen to be appreciated, but it certainly showed us that our automotive mechanics class was a complete success so far as student interest was concerned.

When the coupe, at that stage only a chassis without even a seat, purred on down the road a visitor would have known for sure that those students, watching it with a glow of pride in their eyes, were getting something from that course. They went on to put the body and accessories on the old car and, although the whole project was planned primarily as a task for the class and therefore for their benefit, later developments made that coupe of great aid to the school. Many times during the past winter when our panel body or light pickup has been in the shops that old coupe, lovingly put together by the automotive mechanics class, has gone to work and done its share.

For those who might be interested in having such a course in automotive mechanics in their school the first thing to do, of course, is to get in touch with the state department of education.

In fitting the course into a school curriculum, time must be found for a three-hour work period each afternoon, and although at first this seems a little awkward, it can usually be arranged easily enough with a bit of cooperation on the part of all concerned. Some lunch periods may be sliced a bit, courses shifted, and, where absolutely necessary, schedules rearranged somewhat. All in all, though, the time element is usually no great difficulty.

One of the most important points to consider in arranging such a course is the qualifications of the man to teach it. Since success or failure depends largely on him, it is extremely important that he be selected with care. The state department has certain regulations which must be met in selecting a teacher, but these are at a minimum. Some effort should be made to find a teacher who has had years of experience in the field of automechanics, and has also had experience in working with men. This last factor, the ability to handle people, cannot be stressed too much. The knowledge and experience must be there, but the experience of working with other people is of almost equal importance.

Space is another consideration which must be taken into account. Although the space requirements are not large, room must be adequate. Sufficient space must be allowed for a training station for each five students in the class. This so-called training station consists of a low table around which they can work in assembling and disassembling parts.

Automotive equipment, the more the better, must be provided for the students to work with. All garages are usually glad to cooperate in loaning equipment, giving it outright, or allowing service to be done on a basis where they furnish the parts and the class the work. Since the school work is supervised by an expert, most garages will be glad to rustle up some piece of equipment they have been intending to put in service and haven't had time in which to do it. Washing-machine and lawn-mower motors are excellent starting tasks for the students. Where they are available, small bicycle power plants can be reworked profitably.

In all cases, as stated earlier, emphasis should be on having the student *do* the work rather than on watching it being done. Consequently, the more automotive equipment there is for the student to work with and familiarize himself with the better.

The course outline also covers some fields of work, such as light metalwork, metal cutting, and welding, which are designed to make the course of value in a broad sense to students going into the armed forces.

With a good teacher, any school can offer a course which will not only be enthusiastically received by the students but which also will make a real contribution to the student's life whether he goes into the services, into defense work, or fights the war on a farm.

Needless to say, we have another class organized and going this spring. Yes, we are pleased with the class and we were much more than pleased when Johnny wrote us his glowing letter and unknowingly gave us the final seal of approval, "I have already received a promotion . . ."

★ ★ ★ ★ ★

"Skills obtained in the program of Vocational Training for War Production Workers have proved of great value to many thousands of young men who have gone into the armed forces."—L. S. Hawkins, Director, Vocational Training for War Production Workers, U. S. Office of Education.

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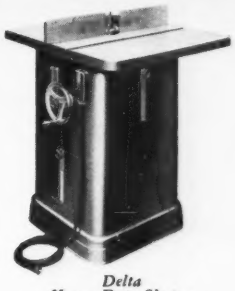

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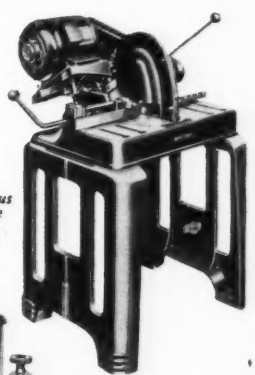

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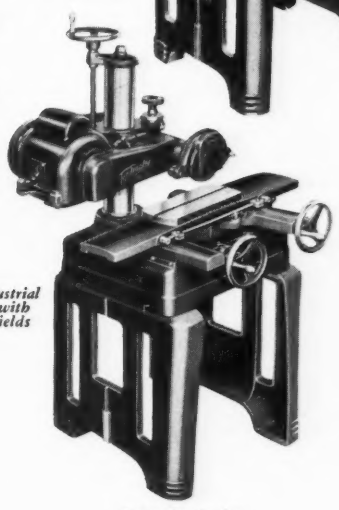

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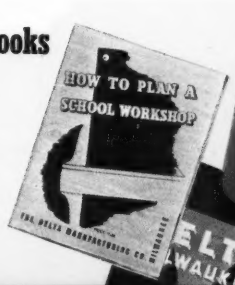

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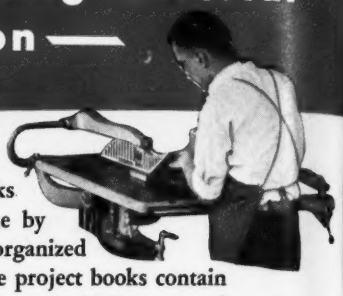

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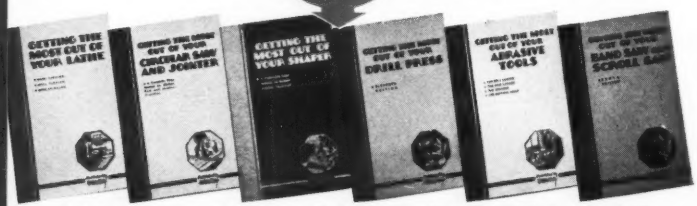
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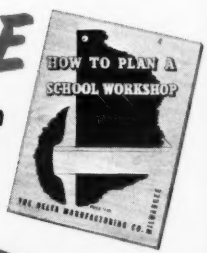

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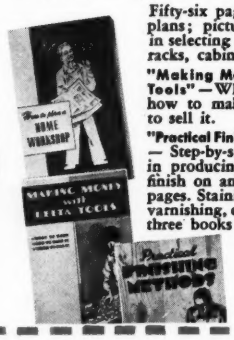

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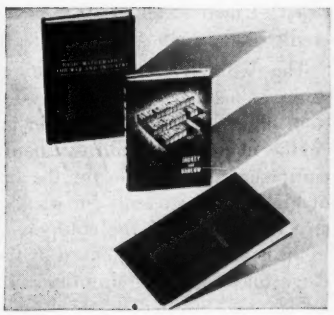

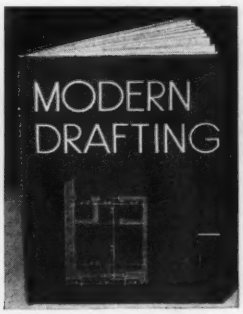

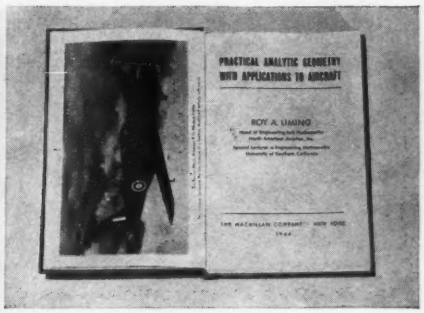

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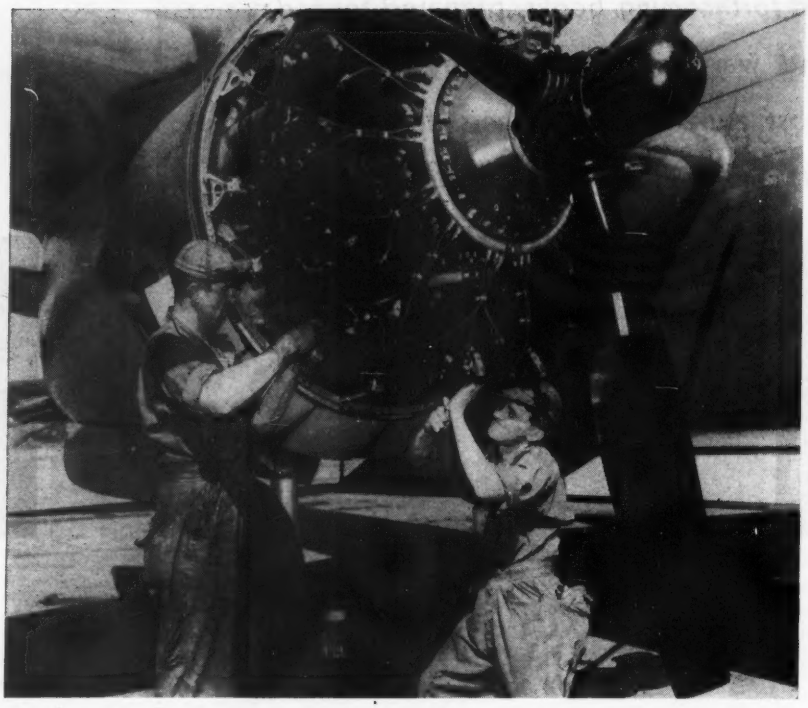


Two Air Force corporals at a field in the British Isles prepare a plane for a combat mission.

Aircraft Maintenance for High Schools

BY *Richard L. Hirsch*

PIT

The future Air Corps member would have an excellent background if he went through the course in aviation offered at the Central High School, Cape Girardeau, Missouri, where Richard L. Hirsch is the instructor. This article gives full details of the course of study.

ALTHOUGH intensely interested in aeronautics, high-school students have had little opportunity to come in contact with practical aviation but it is amazing how much they have learned from books and magazines through their own efforts and direction. This effort has been an incentive to touch and handle the plane and its parts, thus creating a most desirable attitude for school work in airplane mechanics. If the schools do not accept this challenge they are losing a very forceful advantage in the war effort and in the education of the youth of today. For various reasons airport personnel have taken little interest in these younger folk. Flying time and aviation courses have been beyond the average high-school boy's pocketbook.

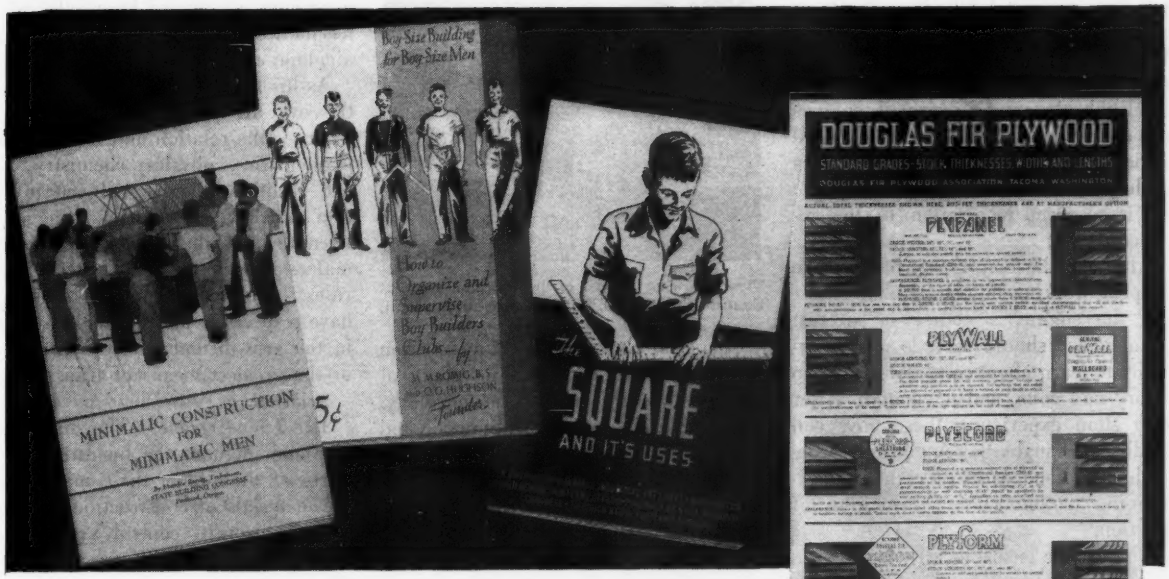
Based on the belief that aviation is to play a major part in our future life, it is felt that boys and girls in high school should be given a chance to become acquainted with the field and an opportunity to become a part of it. With so many young men going into military service as they are graduated from high school—a good majority are interested in the air force—the need for this training becomes more than desirable, it is now an obligation to the youth and to our nation. In view of this, it was decided to include an aviation course for credit in the high-school curriculum.

The War Production Training Program, sponsored by the board of education, offers a night program in aircraft engine maintenance and overhaul. This equipment is available for the training of high-school students for day-time instruction. Much of the equipment used in the course has been loaned by the War Department with all supplies and some equipment supplied by the local board of education. The Army Air Force offers some of its surplus ground school equipment, such as engines, parts, and fuselages, to schools needing it for preflight training.

It is the ambition of many a high-school boy to enlist in the Air Corps for training as a pilot, navigator, bombardier, or mechanic and therefore he is very much interested in preparing himself in high school for this opportunity. He wants to know the parts of a plane,

Future aircraft engine mechanics in Washington High School, Los Angeles, California, assembling a plane engine as part of a preinduction course.

Official OWI Photo by Palmer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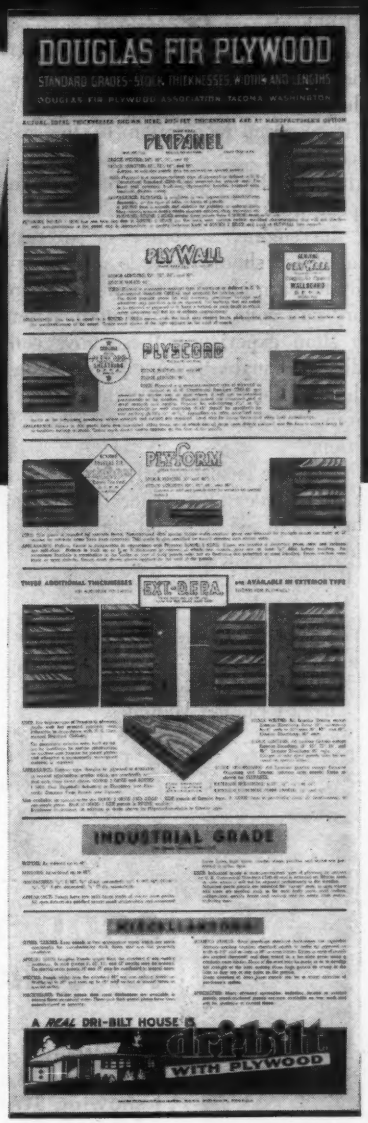

Also available without charge is this wall chart, showing grades, sizes and thicknesses of Douglas fir plywood—with brief outlines of the uses for each type and grade of plywood.

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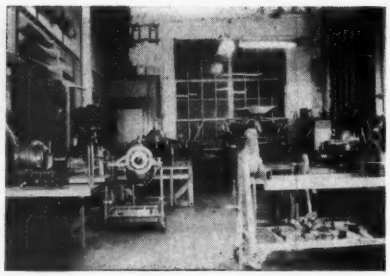
how they function, the tools necessary to repair them, and how to use these tools. As part of the actual shop work on planes, arrangements were made with the local airport to overhaul engines and repair wings and parts of damaged planes. The enthusiasm of the students as they see these repaired planes in the air is a great inspiration to the instructor.

Although the major part of the time is spent working on the airplane itself and the engine, a course in aircraft maintenance should include an opportunity to learn about meteorology, radio theory and code, and navigation. After such shop experience, these boys can readily be taught the Army and Navy method without losing precious time explaining the elementary principles of aviation.

This course is specifically designed to give the students a general working knowledge of aviation and the course is divided into six parts:

1. Related Subjects ------ 15 hours
2. The Airplane---------- 60 hours
3. Meteorology ---------- 15 hours
4. Navigation ---------- 15 hours
5. Radio Code, Theory--- 15 hours
6. Aircraft Engine Maintenance ----------150 hours



View showing a part of the aviation shop at Central High School, Cape Girardeau, Missouri.

A special classroom is set apart from the shop and is equipped for study of (1) related subjects, (3) meteorology, (4) navigation, and (5) radio code and theory. The other two divisions, (2) the airplane and (6) aircraft engine maintenance, are taught in the shop which is adequately equipped for actual work experience. The following explanation will show the scope of each of these six divisions as they are studied in the class and through shop work:

I. *Related Subjects.*—At one time it was believed that flying skill was the only requisite for a successful pilot. Today a good pilot must have a background of knowledge about the weather, navigation, meteorology, aerodynamics, radio communication, air-traffic rules, and must have a practical knowledge of the mechanics of both the airplane and the airplane engine.

As his first step, the student must see the over-all picture of aviation. He must see the relation and importance of mathematics, physics, chemistry, English, health, and other subjects to aviation and have an understanding of the strength and durability of materials, understand the need to observe safety rules, how to use common sense, and have respect for and do his best to help in the growth and development of one of the greatest means of transportation —aviation.

II. *The Airplane.*—The study of the airplane includes the operation of the parts of the plane, their maintenance, the materials of construction, disassembly of aircraft, control systems, fuel systems, tubes, couplings and connections, fuel pumps and strainers, annealing, fuel-line installation, subassembly and final assembly of aircraft, cable splicing, maintenance of wheels and brakes, hydraulic and mechanical, pneudraulic shock struts, mechanical and hydraulic wing flaps, retractable landing gears, spray-finishing equipment, preparation of surfaces for finishing, fabric covering, and many other features.

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"The inductee with trade skills and related technical knowledge has an advantage when he enters the Army."—John A. McCarthy, Assistant Commissioner of Education, New Jersey, and President, American Vocational Association.

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III. *Meteorology.*—This includes becoming familiar with the vocabulary necessary to understand the subject. A brief history of the United States weather observation facilities, the weather map, the symbols used on the teletypewriter, and a study of the meteorological elements and their application for a pilot's use is covered in this section.

A detailed study of clouds and air masses and their characteristics is made.

IV. *Navigation.*—This instruction includes a study of the language of navigation, the art of map making, problems in pilotage, dead reckoning, the application of variation, deviation, and drift in simple navigation, and radius-of-action problems returning to the same or an alternate airport. It is the object of this phase of the course to train the student in all phases of dead reckoning and air pilotage and to lead up to celestial navigation.

Included is the correction and observation of compass error, correction for wind, layout of a course, and many other problems involving the phases of navigation required in overland flying.

V. *Radio Code and Theory—(Radio Code).* A practical course in reception of the International Morse Code is offered. An automatic code machine, instructor hand sending, and individual code practice between students provides practice that should enable the average student to achieve ten words per minute. *(Radio Theory)* Radio theory applies basic electricity and theory to aircraft radio circuits and apparatus. It deals with the functions of the diode and triode unit, antenna theory, Ohm's law, reactance, resonant truing circuits, superheterodyne theory, and other phases in sufficient detail for license requirements.

VI. *Aircraft Engine Maintenance.*—This includes becoming familiar with all engine parts; accessory and inspection procedure for power-plant maintenance and overhaul; and laboratory work on air-transport engines such as Pratt & Whitney Twin-Row, Allison V-1710, Ken-Royce 5-F, Continental A-65, Lycoming O-145, P & W Wasp R-1340, P & W Hornet R-1690, P & W R-985-11A, Wright Cyclone R-1830, Wright J-5, and Curtiss Conqueror V-1150F.

Project study is made of materials, design, and construction features of engine units such as crankshafts, crankcases, superchargers, cylinders, and pistons.

Practical study is made of valve mechanism and drive arrangements; engine assembly procedures; adjusting timing clearances; shop and field methods of timing valves; checking condition, installing, synchronizing, or staggering of timing of magnetos; installation of ignition wiring "harness"; disassembly, construction, and assembly of all late-type magnetos.

Also included is study of propeller servicing, checking, and track and balance. Classroom discussion is carried on of layout of wet and dry sump oiling systems; automatic temperature regulators and filters; and electrical systems, batteries, generators, starters, switches, and solenoids. An effort is made to correlate classroom and shop instruction to the end that the student retains a practical picture of each subject he studies.

PHOTOGRAPH CREDIT

Thanks are due the Signal Corps for photographs on page 7; page 9, column 3; page 13, bottom; page 16, bottom; page 17, bottom; page 18; page 22, bottom; and page 28, top.

To the Training Aids Branch, O.R.T.C., Aberdeen Proving Ground for page 10; page 11, bottom; page 19; and page 23.

To the Air Corps for page 17, top.

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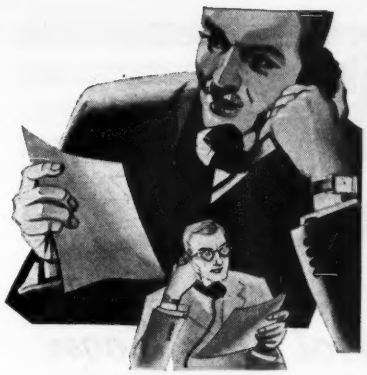

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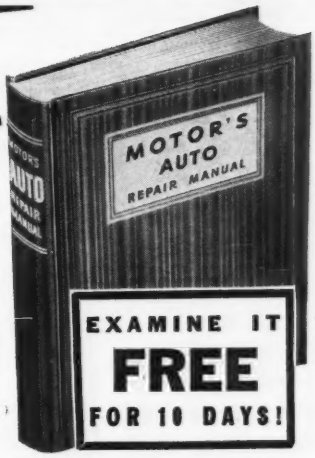

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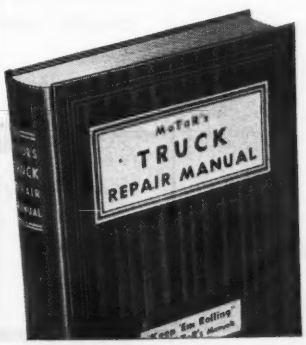

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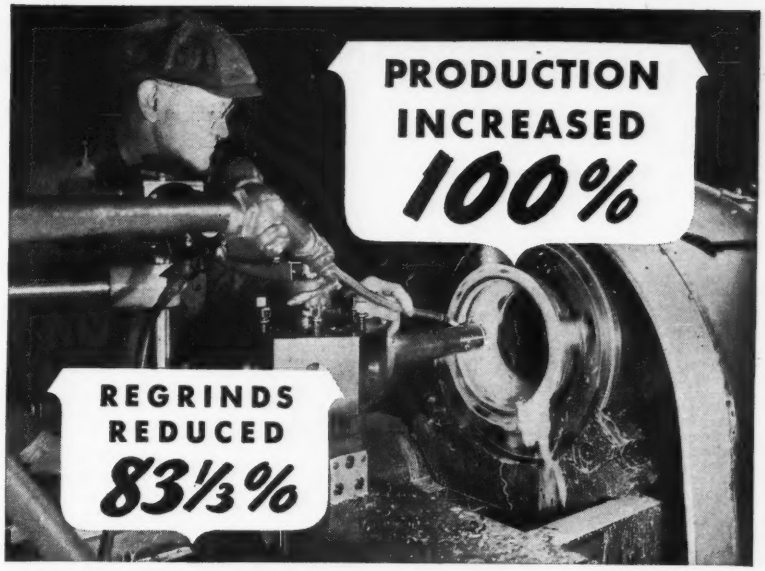

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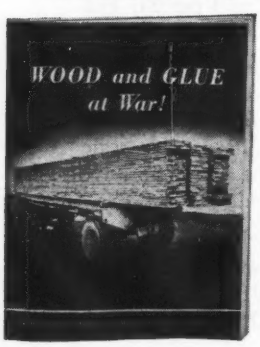

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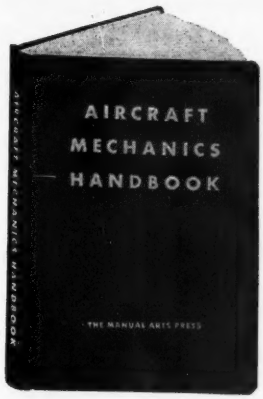

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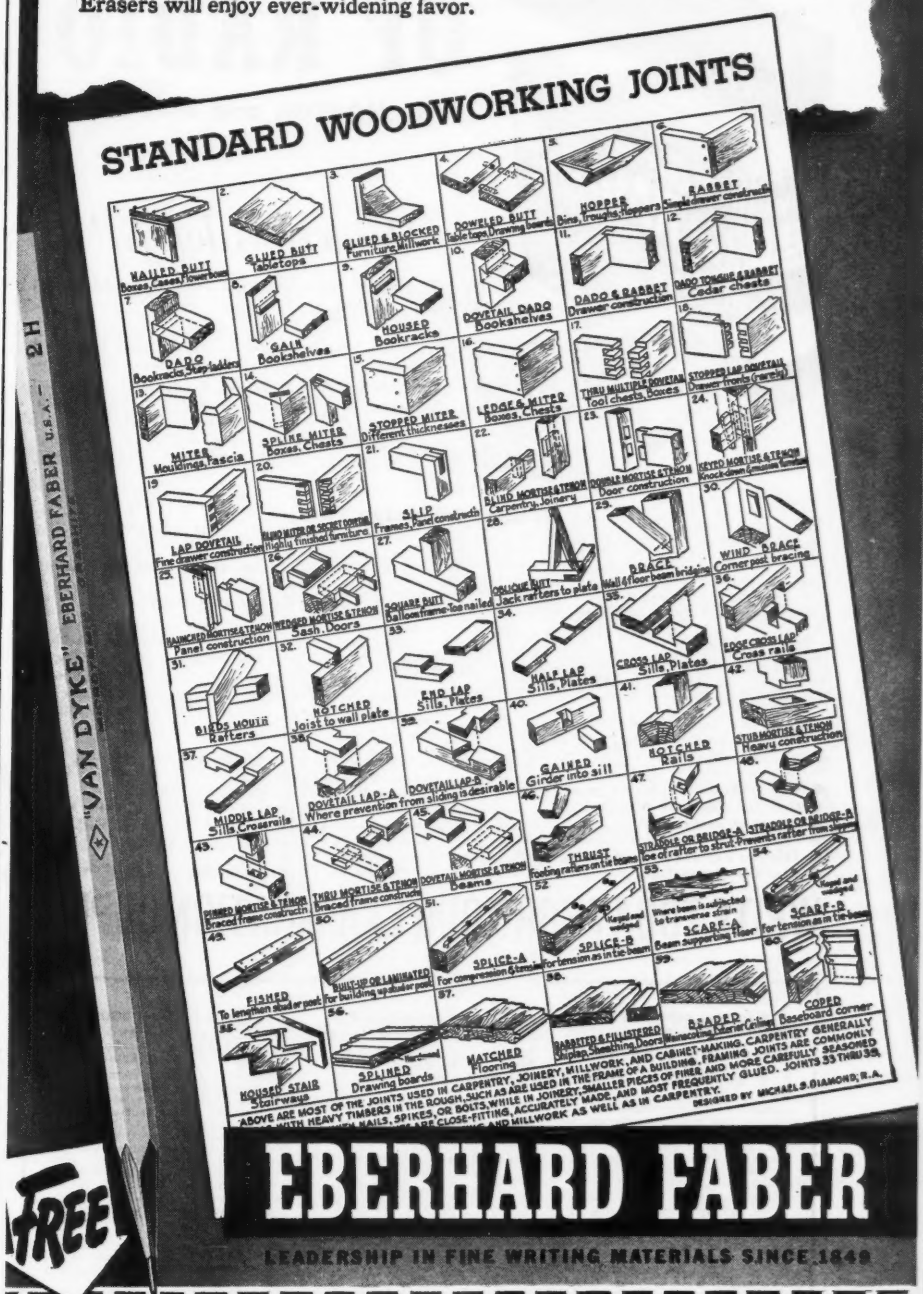

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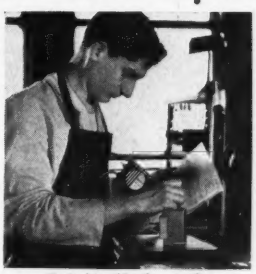

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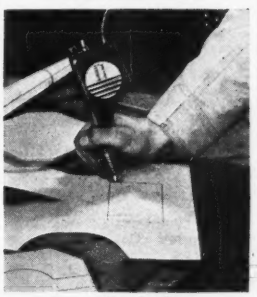

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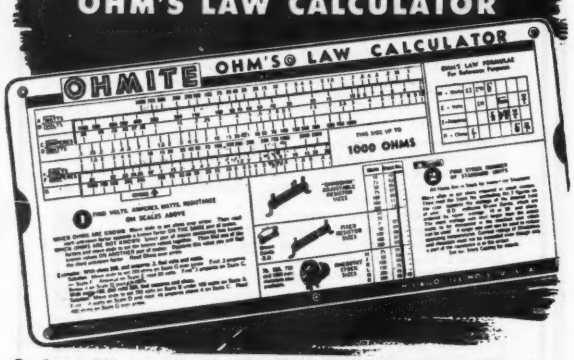

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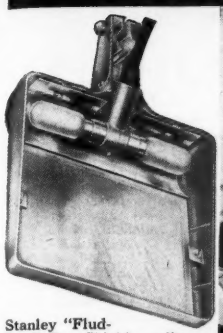

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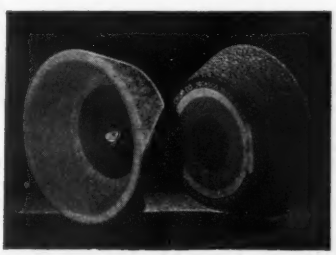

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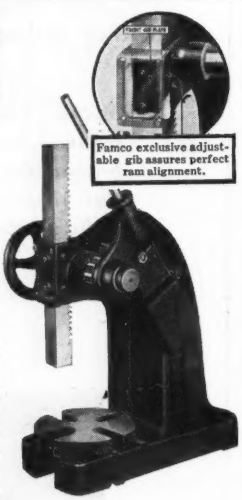

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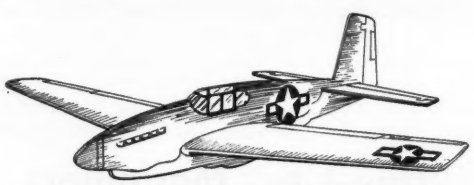

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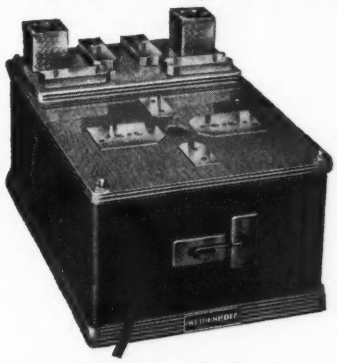

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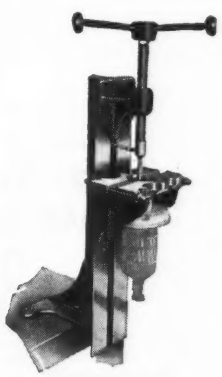

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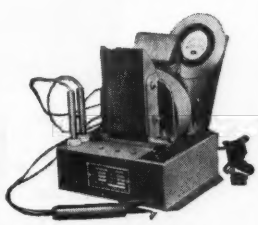

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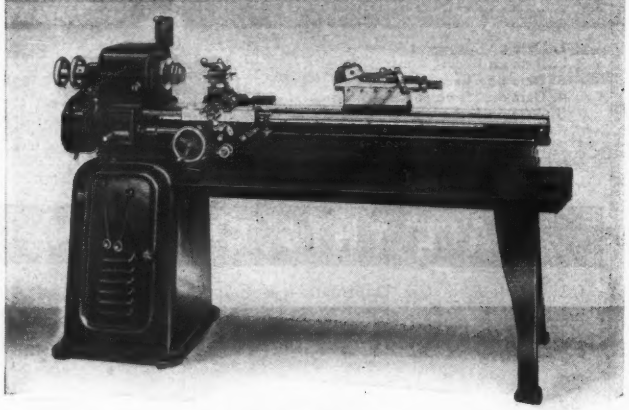

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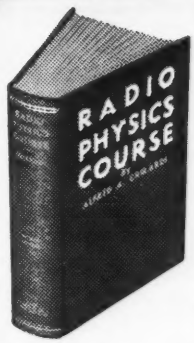

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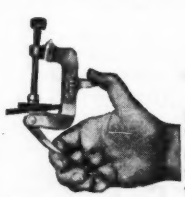

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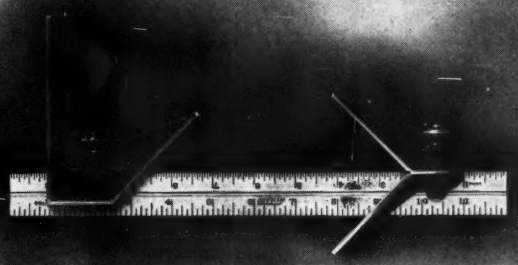

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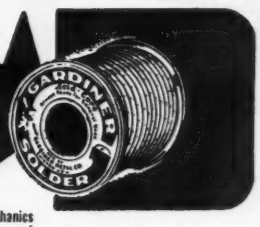

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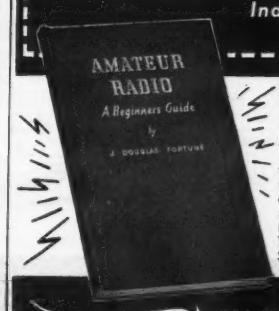

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from Washington *from page 50*

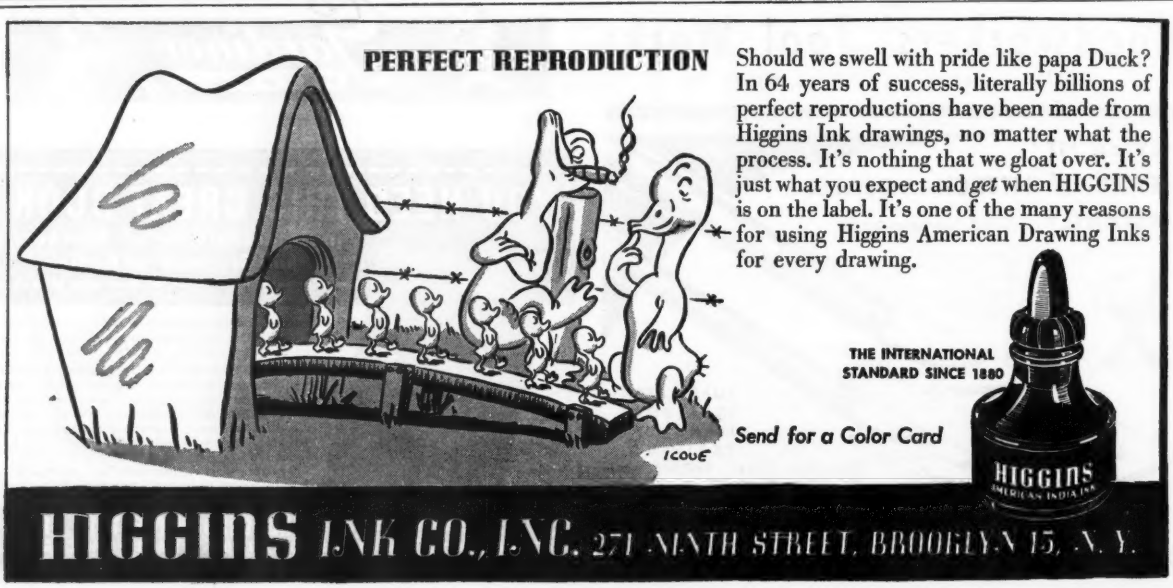
community. Some 100 of these training councils are already in existence—pooling information regarding training needs, planning next steps to meet training needs and exchanging information with schools, industry, and government agencies.

● As your reporter made the rounds of Washington agencies he heard:

At the Office of Vocational Rehabilitation: "Did you hear of the 'marriage' of the Employment Service and Vocational Rehab? We'll train 'em; they'll place 'em. Looks like a good way to bring these two services together."

At the U. S. Office of Education: "No, we have no statement on federal aid to here. But did you know that during 1942 the federal government contributed more than $300,000,000 to the states for various educational purposes? This is the highest amount ever to be poured from the U. S. Treasury into the state coffers."

At the Bureau of Training, WMC: "And for the fourth consecutive summer—no vacations for trade schools, no closings, no slowing down of war training. What the schools did during the last four summers and winters will tell their story when the invasion is launched this year."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That's the thing to do in wartime. Eat every bite of food, save every scrap of soap, make a patriotic habit of stretching all the supplies in the house so they go further, last longer.

Wear it out . . .

This year old coats, old shoes, are a badge of honor. They show you're sensible enough to know that one way to help win the war, to keep prices down, is to wear your old things out!

Make it do . . .

Before you spend a penny in wartime, ask yourself, "Do I really need this? Or do I have something now that will do?" As you patch and darn and turn, you're keeping prices down.

or do without!

When you put your money in War Bonds, savings, taxes, insurance—you're putting your money to work fighting the war and building a sound, stable nation for the peace to come.

It's your money you're saving when you help keep prices down. For it's buying too much when there's too little to buy that sends prices up. And when prices go up—and keep going up—your savings, your future, are in danger.

How can you help keep prices down?

By never spending a thin dime you could turn into a War Stamp. By thinking twice—and thinking "No"—at every urge to open your purse.

By wearing old things out, making makeshifts do. Remember, it's the things you *don't* buy that keep prices down!

See that prices go no higher . . . Be a saver—not a Buyer!

HELP US KEEP PRICES DOWN

A United States war message prepared by the War Advertising Council; approved by the Office of War Information; and contributed by this magazine in cooperation with the Magazine Publishers of America.

from WASHINGTON by MICHAEL PACA

THIS is the time of the year when Washington's parks, lawns, and very sidewalks burst into a sea of greenery and gay flowers. But this is also budget-justification time for federal agencies; and Washington officials have little time to enjoy the Capital's brief, beautiful spell. Congress is calling up agency by agency to ask: "What did you do with the money we gave you last year? Why are you asking for so many millions again this year?"

Hence, government officials are working late into the night summarizing the year's achievements, activities, results. As this Letter is being written education's leaders are immersed in the same tasks. But this year vocational educators will troop up to Capitol Hill without trepidation. They are not only convinced of the prodigious successes of the Vocational War Training, ESMWT, Food Production Training, and the Visual Aids Services, to name only the major war training services, but they are, in addition, asking only one-third of the total funds they received last year.

For example, War Production Training will require only $21,000,000 in 1944-45 as against $90,000,000 during the current year. ESMWT will require $9,000,000 as against $25,000,000. Even the Visual Aids Services and the Food Production War Training, two programs for which Congress has a warm feeling, are lowering their estimates for the coming year.

Federal vocational officials are asking to operate the various war programs an over-all total of $43,000,000—against $129,500,000 for last year. Here is proof that the peak of war training has passed. Here is also proof that "bureaucrats," at least of the school-shop brand, can scale down, of their own volition, demands for public funds.

● Educators have other business on Capitol Hill this month besides working on their budget justifications for educational programs.

They're trooping to Senate and House committee rooms to protest against Title II of the Omnibus Bill (S. 1767), which relates to veterans' education. So far Congress has been unmoved by the pleas that this title is unsound for at least two reasons: it lodges administration of the program in the hands of the Veterans' Administrator and leaves it up to that Administrator to decide whether the established state educational agencies shall be utilized in the veterans' education effort.

They're trooping up Capitol Hill also to keep Congress reminded that schools have a vital interest in the disposal of surplus property. Nothing has happened on this front yet—but the strategy of Washington leaders is to keep telling Congress that schools want both top priorities in buying surplus material as well as outright grants of educational equipment to retrain veterans and war workers.

They're trooping up also to press their interest in passage of a school lunch program. At this moment it appears, however, that the U. S. Office of Education and the U. S. Department of Agriculture have locked horns on this issue without hope for a break. The Office of Education insists on the Smith-Ellender measure which seeks "to make school lunches educational"—meaning primarily that the program should be administered through established state educational agencies. The Department of Agriculture, looking on school lunches merely as a method for marketing farm products, wants to retain control.

● At long last the Bureau of Training of the War Manpower Commission has a new director. He is Philip S. Van Wyck, who had been acting as head of the Bureau ever since Dr. W. W. Charters' resignation more than a year ago. A former machinist's apprentice and locomotive fireman, Mr. Van Wyck is a Purdue University graduate. From 1925 to 1942 he was head of the Metal Trades Department at Dunwoody Institute.

In a special statement for SCHOOL SHOP readers, Mr. Van Wyck said that as the country's manpower supply dwindles, organized training grows in importance.

"The trend in organized training now is away from the preemployment type, while the training of persons already on payrolls has increased," Mr. Van Wyck said. "Also, during the present period of high production, training has been principally on single skills. As we approach and enter the postwar period, the tendency undoubtedly will be toward the development of multiple skills."

Enrolments in the programs of war-production training conducted by the training agencies associated with the Bureau of Training have passed 12,000,000 since the defense program began in 1940, Mr. Van Wyck announced. The goal for this year has been set at 8,000,000.

From the War Manpower Commission also comes news this month that it is encouraging the establishment of training councils on state and local levels. Major purpose of these councils is to gear vocational schools closer to the industrial and manpower needs of the

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- **We now spend 20% of what we used to for blading. 9,500 feet of DoALL Buttress blading does the work of 25,000 to 30,000 feet of blading formerly used.**
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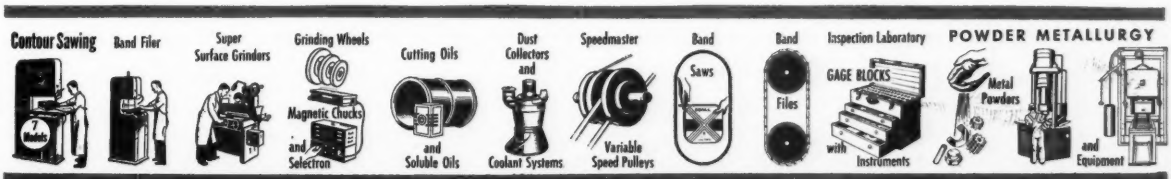

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